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Junos® OS

Overview for Junos OS

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JUNOS

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About This Guide

Use this guide to get familiar with the various functions of Junos OS devices, and learn how to configure, monitor, and manage them.

PART 1

Understanding Junos OS

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CHAPTER 1

Junos OS Software Overview

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About the Overview for Junos OS

The Overview for Junos OS is intended to provide a technical and detailed exploration of Junos OS, explaining both concepts and operational principles, as well as how to configure and use Juniper Networks devices.

In this guide, we cover:

- Understanding Junos OS
- Security management
- Device configuration
- Device monitoring

- Managing network devices
- Using configuration statements and operational commands

For a basic introduction to Junos OS, see the Getting Started Guide for Junos OS. It provides a high-level description of Junos OS, describes how to access devices, and provides simple step-by-step instructions for initial device configuration.

For introductory and overview information specific to Junos OS Evolved, see Introducing Junos OS Evolved. This guide will acquaint you with Junos OS Evolved, the next generation Junos OS, and explain its strengths, similarities to, and differences from Junos OS.

To learn how to use the Junos OS command-line interface (CLI) and understand more advanced Junos OS topics, see the CLI User Guide. This guide explains how to use the CLI, enter configuration statements, manage configurations, and enter operational commands for monitoring Junos OS networking devices.

RELATED DOCUMENTATION

> CLI User Guide
>
> Getting Started Guide for Junos OS
>
> Introducing Junos OS Evolved

Junos OS Overview

Juniper Networks provides high-performance network devices that create a responsive and trusted environment for accelerating the deployment of services and applications over a single network. The Junos operating system (Junos OS) is the foundation of these high-performance networks. Unlike other complex, monolithic software architectures, Junos OS incorporates key design and developmental differences to deliver increased network availability, operational efficiency, and flexibility. These key advantages are:

- One operating system
- Concurrent software releases
- Modular software architecture

One Operating System

Unlike other network operating systems that share a common name but splinter into many different programs, Junos OS is a cohesive operating system that is supported across all devices and product

lines. This enables Juniper Networks engineers to develop software features once and share the features across product lines simultaneously. Because features are common to a single source, generally these features are implemented the same way for all of the product lines, reducing the training required to learn different tools and methods for each product.

Concurrent Software Releases

Each new mainline version of Junos OS is released concurrently for all product lines. Each new Junos OS release includes working features released in previous versions of the software and must achieve zero critical regression errors. Any deprecated features or functions are not only announced, but any needed workarounds or solutions are provided. This discipline ensures reliable operations for the entire release.

Modular Software Architecture

Although individual architecture modules of Junos OS communicate through well-defined interfaces, each module runs in its own protected memory space, preventing one module from disrupting another. It also enables the independent restart of each module as necessary. This is in contrast to monolithic operating systems for which a malfunction in one module can ripple to other modules, possibly causing a full system crash or restart. This modular Junos OS architecture provides a high level of performance, high availability, security, and device scalability not found in other operating systems.

Generally, Junos OS is preinstalled on your Juniper Networks device when you receive it from the factory. When you first power on the device, all software starts automatically. You then configure the software so that the device can participate in your network. However, if needed, you can order Juniper Networks devices without any software installed, for additional flexibility.

You can upgrade the device software as new features are added or software problems are fixed. You obtain new software by downloading images from the Juniper Networks Support website onto your device or another system on your local network, then install the software upgrade on the device.

Juniper Networks devices run only binaries supplied by Juniper Networks. Each Junos OS image includes a digitally signed manifest of executables, which are registered with the system only if the signature can be validated. Junos OS will not execute any binary without a registered fingerprint. This feature protects the system against unauthorized software and activity that might compromise the integrity of your network devices.

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Junos OS Architecture Overview

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- Routing Process Architecture | 5

This topic provides an overview of the Junos OS routing process architecture:

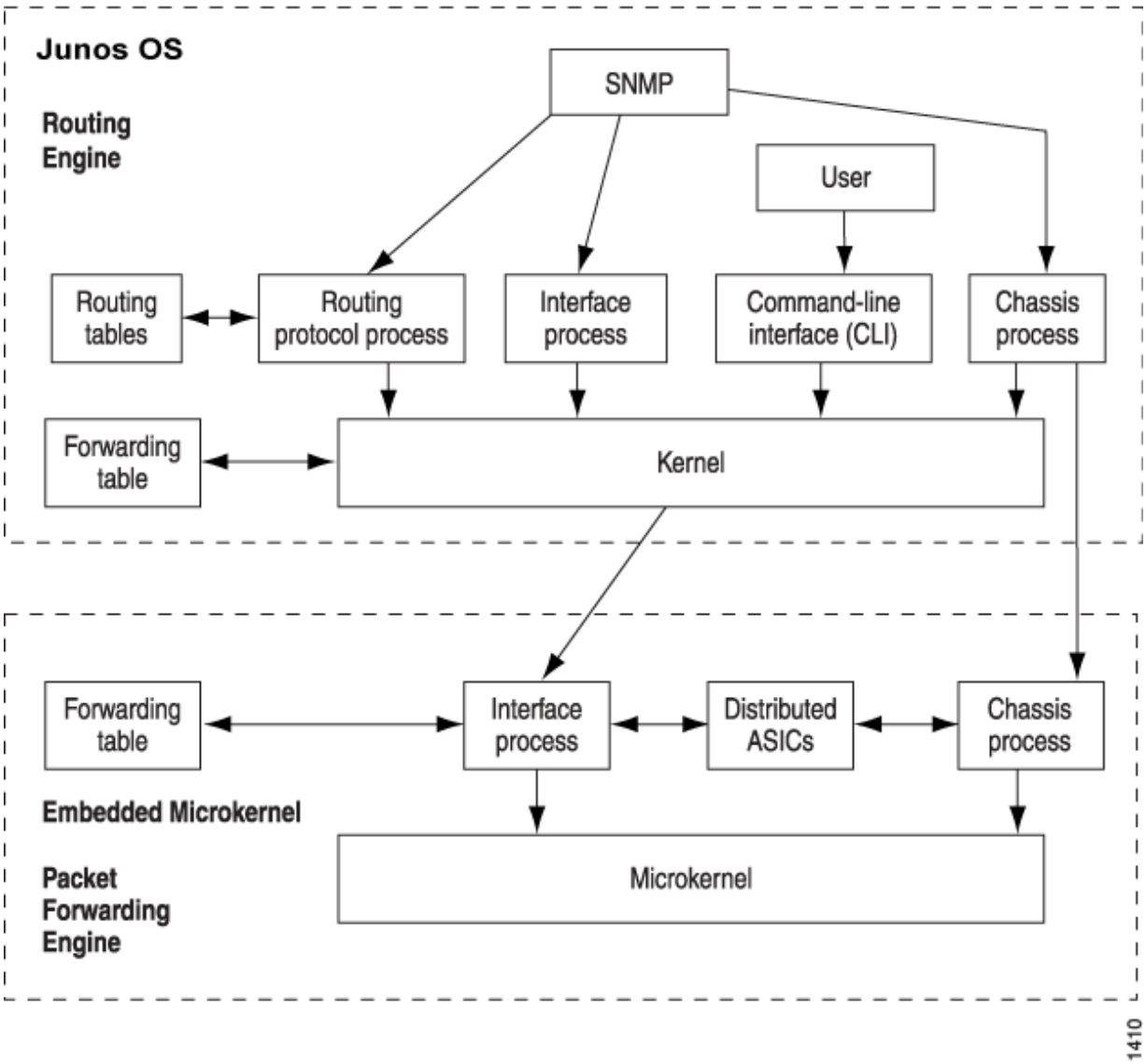
Routing Process Architecture

The routing process is handled by the following two components (see Figure 1 on page 6):

- *Routing Engine*
- *Packet Forwarding Engine*

Because this architecture separates control operations such as routing updates and system management from packet forwarding, the router can deliver superior performance and highly reliable Internet operation.

Figure 1: Product Architecture



Packet Forwarding Engine

The Packet Forwarding Engine uses application-specific integrated circuits (*ASICs*) to perform Layer 2 and Layer 3 packet switching, route lookups, and packet forwarding. The Packet Forwarding Engine forwards packets between input and output interfaces.

Routing Engine

The Routing Engine controls the routing updates and the system management. The Routing Engine consists of routing protocol software processes running inside a protected memory environment on a general-purpose computer platform. The Routing Engine handles all of the routing protocol processes

and other software processes that control the routers' interfaces, some of the chassis components, system management, and user access to the router. These routers and software processes run on top of a kernel that interacts with the Packet Forwarding Engine.

The Routing Engine has these features:

- Routing protocol packets processing—All routing protocol packets from the network are directed to the Routing Engine, and therefore do not unnecessarily delay the Packet Forwarding Engine.
- Software modularity—Software functions are in separate processes, so a failure of one process has little or no effect on other software processes.
- In-depth IP functionality—Each routing protocol is implemented with a complete set of IP features and provides full flexibility for advertising, filtering, and modifying routes. Routing policies are set according to route parameters, such as *prefix*, prefix lengths, and Border Gateway Protocol (*BGP*) attributes.
- Scalability—Junos OS routing tables are designed to hold all the routes used in current and near-future networks. Additionally, Junos OS can efficiently support large numbers of *interfaces* and *virtual circuit*s.
- Storage and change management—Configuration files, system images, and microcode are held and maintained in one primary and two secondary storage systems, permitting local or remote upgrades.
- Monitoring efficiency and flexibility—Alarms are generated and packets are counted without adversely affecting packet forwarding performance.

The Routing Engine constructs and maintains one or more routing tables. From the routing tables, the Routing Engine derives a table of active routes, called the *forwarding table*, which is then copied into the Packet Forwarding Engine. The forwarding table in the Packet Forwarding Engine can be updated without interrupting the router's forwarding.

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Router Hardware Components

Junos OS runs on all Juniper Networks devices, including both routers and switches. This section focuses specifically on router hardware components.

Table 1 on page 8 lists the major hardware components in each router series.

NOTE: The ACX Series router is a single-board router with a built-in Routing Engine and one Packet Forwarding Engine. The "pseudo" FPCs and PICs are described in *ACX2000 and ACX2100 Routers Hardware and CLI Terminology Mapping*.

Table 1: Major Router Hardware Components

	M Series	MX Series	T Series	PTX Series	J Series
Routing Engines	X	X	X	X	X
Control Board	X		X	X	
Switch Interface Board (SIB)	X		X	X	
Forwarding Engine Board (FEB)	X				
Power Supply	X	X	X	X	X
Cooling System	X	X	X	X	X
Dense Port Concentrators (DPC)		X			
Switch Control Board (SCB)		X			
Flexible PIC Concentrators (FPC)	X	X	X	X	
Physical Interface Module (PIM)					X
Physical Interface Card (PIC)	X	X	X	X	

Flexible PIC Concentrators (*FPCs*) are each populated by *PICs* for various interface types. On some routers, the PICs are installed directly in the chassis.

For information about specific components in your router, refer to its hardware guide.

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Junos OS Routing Engine Components and Processes

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Junos OS also runs on the *Routing Engine*. Junos OS consists of software processes that support Internet routing *protocols*, control router interfaces and the router chassis, enable router system management, and much more. Junos OS processes run on top of a *kernel*, which enables communication between processes and provides a direct link to the Packet Forwarding Engine software. Junos OS can be used to configure routing protocols and router interface properties, as well as to monitor and troubleshoot protocol and network connectivity problems.

The Routing Engine software consists of several software processes that control router functionality and a kernel that provides the communication among the processes. Following is a listing of the major Routing Engine-related processes.

Routing Engine Kernel

The Routing Engine kernel provides the underlying infrastructure for all Junos OS processes, including providing the link between the routing tables and the Routing Engine's forwarding table. The kernel is also responsible for all communication with the *Packet Forwarding Engine*, which includes keeping the Packet Forwarding Engine's copy of the forwarding table synchronized with the master copy in the Routing Engine.

Initialization Process

When the device boots, an initialization process (init) starts and monitors all the other software processes.

If a software process terminates or fails to start when called, the init process attempts to restart it a limited number of times and logs any failure information for further investigation.

Management Process

The management process (mgd) manages the configuration of the router and all user commands. The management process is responsible for notifying other processes when a new configuration is committed. A dedicated management process handles Junos XML protocol XML requests from its client, which might be the CLI or any Junos XML protocol client.

Process Limits

There are limits to the total number of Junos OS processes that can run simultaneously on a device. There are also limits set for the maximum number of iterations of any single process. The limit for iterations of any single process can only be reached if the limit of overall system processes is not exceeded.

Access methods such as *telnet* and *SSH* spawn multiple system processes for each session created. For this reason, it might not be possible to simultaneously support the maximum number of access sessions for multiple services.

Routing Protocol Process

Within Junos OS, the routing protocol process (rpd) controls the routing protocols that run on the device. The rpd process starts all configured routing protocols and handles all routing messages. It maintains one or more routing tables, which consolidate the routing information learned from all routing protocols. From this routing information, the routing protocol process determines the active routes to network destinations and installs these routes into the Routing Engine's forwarding table. Finally, rpd implements routing policy, which enables you to control the routing information that is transferred between the routing protocols and the routing table. Using routing policy, you can filter and limit the transfer of information as well as set properties associated with specific routes.

Interface Process

The Junos OS interface process enables you to configure and control the physical interface devices and logical interfaces present in a network device. You can configure interface properties such as the interface location, for example, in which slot the Flexible PIC Concentrator (FPC) is installed and in

which location on the FPC the *Physical Interface Card* (PIC) is installed, as well as the interface encapsulation and interface-specific properties. You can configure the interfaces currently present in the device, as well as interfaces that are not present but that you might add later.

The Junos OS interface process communicates through the Junos OS kernel with the interface process in the Packet Forwarding Engine, enabling Junos OS to track the status and condition of the network device's interfaces.

Chassis Process

The Junos OS chassis process (chassisd) enables you to configure and control the properties of the device, including conditions that trigger alarms. The chassisd on the Routing Engine communicates directly with its peer processes running on the Packet Forwarding Engine.

SNMP and MIB II Processes

Junos OS supports the Simple Network Management Protocol (*SNMP*), which helps administrators monitor the state of a device. The software supports SNMP version 1 (SNMPv1), version 2 (SNMPv2, also known as version 2c, or v2c), and version 3 (SNMPv3). The Junos OS implementation of SNMP does not include any of the security features that were originally included in the *IETF* SNMP drafts but were later dropped. The SNMP software is controlled by the Junos OS SNMP and Management Information Base II (MIB II) processes, which consist of an SNMP master agent and various subagents.

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Junos OS Routing Processes

Junos OS consists of multiple processes that run on different platforms and have unique functions. The separation of functions provides operational stability, because each process accesses its own protected memory space. This section provides a brief overview of Junos OS routing-specific processes.

As an example, Table 2 on page 12 describes the processes that run on MX Series 5G Universal Routing Platforms.

Table 2: Junos OS Processes on MX Series Platform

Process	Name	Description
Clksync process (RE)	clksyncd	Defines the operation of synchronous Ethernet and Precision Time Protocol (*PTP*) on a Juniper Networks MX Series router. The operation includes communication with the Packet Forwarding Engine (clock-sync module) to program and process clock events from the *EEC* clock. Operates the PTP stack, exchanges packets, and handles the configuration changes for the modular MX Series (MX80). Controls the configuration and monitoring of the overall operation of the PTP functionality for chassis-based MX Series platforms (MX240, MX480, and so on).
Clock-sync process (PFE)	clock-sync	Programs and monitors the modular interface card (MIC), the CPLD, and the EEC clock. Peer of the clksyncd process module. Captures all PTP and Synchronous Ethernet statistics on the Packet Forwarding Engine and provides them to the Routing Engine.
Interchassis communication process	iccpd	Exchanges proprietary Junos OS messages between two Juniper Networks MX Series routers that take part in a multichassis link aggregation group (*LAG*).
Statistics agent process	stats-agentd	Acts as a relay process to collect interface statistics for all software development kit (*SDK*) applications. Interacts with the pfed process to collect the logical interface statistics for SDK applications.

Table 3 on page 13 lists other processes that are common across Junos OS routing platforms.

Table 3: Junos OS Routing-Specific Processes

Process	Name	Description
Adaptive services process	adaptive-services	Manages the configuration for *stateful firewall*, Network Address Translation (*NAT*), intrusion detection service (*IDS*), and IP Security (*IPsec*) services on the Adaptive Services *PIC*.
Alarm control process	alarm-control	Configures the system alarm.
Access Node Control Protocol (*ANCP*) process	ancpd-service	Works with a special Internet Group Management Protocol (*IGMP*) session to collect outgoing interface mapping events in a scalable manner.
Application identification process	application-identification	Identifies an application using intrusion detection and prevention (*IDP*) to allow or deny traffic based on applications running on standard or nonstandard ports.
RADIUS accounting process	audit-process	Gathers statistical data that can be used for general network monitoring, analyzing, and tracking usage patterns, for billing a user based upon the amount of time or type of services accessed.
Auto-configuration process	auto-configuration	Configures interfaces automatically.
Boot process	bootp	Enables a router, switch, or interface to act as a Dynamic Host Configuration Protocol (*DHCP*) or bootstrap protocol (*BOOTP*) relay agent. DHCP relaying is disabled.
Captive portal content delivery process	captive-portal-content-delivery	Specifies the location to which a subscriber's initial Internet browser session is redirected, enabling initial provisioning and service selection for the subscriber.

Table 3: Junos OS Routing-Specific Processes *(Continued)*

Process	Name	Description
Universal Edge Layer 2 Tunneling Protocol process	ce-l2tp-service	(M10, M10i, M7i, and MX Series routers only) Establishes L2TP tunnels and Point-to-Point Protocol (*PPP*) sessions through L2TP tunnels.
Ethernet *OAM* connectivity fault management process	cfm	Monitors the physical link between two switches.
Chassis control process	chassis-control	Manages the chassis.
Class of service process	class-of-service	Controls the network device's *CoS* configuration.
Ethernet clock synchronization process	clksyncd-service	Uses Synchronous Ethernet (*SyncE*) for external clock synchronization .
Craft interface *I/O* control process	craft-control	Controls the I/O of the craft interface.
Database replication process	database-replication	(EX Series switches and MX Series routers only) Manages the replication of updates from the primary to the client in the database management system.
Datapath trace process	datapath-trace-service	Traces the path taken by the packet through the network.
Dynamic Host Configuration Protocol process	dhcp-service	(EX Series switches and MX Series routers only) Enables a DHCP server to allocate network IP addresses and deliver configuration settings to client hosts without user intervention.

Table 3: Junos OS Routing-Specific Processes *(Continued)*

Process	Name	Description
Diameter process	diameter-service	Implements the Diameter protocol which uses the Transmission Control Protocol (*TCP*) and Stream Control Transmission Protocol (*SCTP*) instead of User Datagram Protocol (*UDP*), for monitoring the network.
Disk monitoring process	disk-monitoring	Checks the health of the hard drive on the Routing Engine.
Dynamic flow capture (*DFC*) process	dynamic-flow-capture	Controls the DFC configurations on Monitoring Services III PICs.
ECC parity errors logging process	ecc-error-logging	Logs the ECC parity errors into the memory on the Routing Engine.
Connectivity fault management (*CFM*) process	ethernet-connectivity-fault-management	Provides IEEE 802.1ag OAM CFM database information for CFM maintenance association end points *(MEPs)* in a CFM session.
Ethernet *OAM* Link-Fault-Management process	ethernet-link-fault-management	(EX Series switches and MX Series routers only) Provides the OAM link fault management (*LFM*) information for Ethernet interfaces.
Event processing process	event-processing or eventd	Configures the application to handle all generated events.
Firewall process	firewall	Manages the firewall configuration and enables accepting or rejecting packets that are transiting an interface on a device.

Table 3: Junos OS Routing-Specific Processes *(Continued)*

Process	Name	Description
General authentication process	general-authentication-service	(EX Series switches and MX Series routers only) Manages general authentication of a user.
Inter-Chassis Communication Protocol (*ICCP*) process	iccp-service	Synchronizes data within a set of two (or more) *PEs* that form a redundancy group (*RG*).
IDP policy process	idp-policy	Enables various attack detection and prevention techniques on traffic traversing the network.
Integrated Local Management Interface process	ilmi	Provides bidirectional exchange of management information between two Asynchronous Transfer Mode (*ATM*) interfaces across a physical connection.
Inet process	inet-process	Configures the IP multicast family.
Init process	init	Initializes the *USB* modem.
Interface control process	interface-control	Controls the router's or switch's physical interface devices and logical interfaces.
Kernel replication process	kernel-replication	Replicates the state of the backup Routing Engine when graceful Routing Engine switchover (*GRES*) is configured.

Table 3: Junos OS Routing-Specific Processes *(Continued)*

Process	Name	Description
Layer 2 address flooding and learning process	l2-learning	Enables a network device to: • Learn unicast media access control (*MAC*) addresses to avoid flooding the packets to all the ports in a bridge domain. • Create a source MAC entry in its source and destination MAC tables for each MAC address learned from packets received on ports that belong to the bridge domain.
Layer 2 Control Protocol process	l2cpd-service	Enables features such as Layer 2 protocol tunneling and nonstop bridging.
Link Aggregation Control Protocol process	lacp	The process: • Provides a standardized means for exchanging information between partner systems on a link. • Allows the link aggregation control instances to reach agreement on the identity of the Link Aggregation Group (*LAG*) to which the link belongs, and then to move the link to that LAG. • Enables the transmission and reception processes for the link to function in an orderly manner.
Link management process	link-management	Manages traffic engineering links.
Local policy decision function process	local-policy-decision-function	Regulates the collection of statistics related to applications and application groups and tracking of information about dynamic subscribers and static interfaces.

Table 3: Junos OS Routing-Specific Processes *(Continued)*

Process	Name	Description
Logical system *multiplexer* process	logical-system-mux or lrmuxd	Manages multiple instances of the routing protocols process (rpd) on a machine running logical routers.
MAC validation process	mac-validation	Configures MAC address validation that enables a network device to validate if received packets contain a trusted IP source and an Ethernet MAC source address.
Management Information Base II process	mib-process	Provides the device's *MIB* II agent.
Mobile IP process	mobile-ip	Configures Junos OS Mobile IP features.
NFS mount requests process	mountd-service	(Some EX Series switches and MX Series routers only) Completes internal NFS mount requests for MS-PIC and MS-MPC.
MPLS Periodic Traceroute process	mpls-traceroute	Enables tracing of forwarding equivalence classes (*FECs*) for *LDP* Layered Service Providers (*LSPs*).
Multiservice process	mspd	Configures multiservice edge routers.
Multicast Snooping process	multicast-snooping	(EX Series switches and MX Series routers only) Makes Layer 3 information, such as the MAC addresses of members of a multicast group, known to Layer 2 devices, such as *VLAN* switches.
DNS server process	named-service	Enables a device to resolve hostnames into addresses.

Table 3: Junos OS Routing-Specific Processes *(Continued)*

Process	Name	Description
Bidirectional Forwarding Detection (BFD) process	neighbor-liveness	Displays the process that specifies the maximum length of time that the device waits for its neighbor to re-establish an LDP session.
Remote *NFS* server process	nfsd-service	Provides remote file access for applications that need NFS-based transport.
Network time process	ntp	Provides the mechanisms to synchronize time and coordinate time distribution in a large, diverse network.
Packet-triggered dynamic subscribers and policy control (PTCP) process	packet-triggered-subscribers	Enables the application of policies to dynamic subscribers that are controlled by a subscriber termination device.
Peer selection service process	peer-selection-service	Enables peer selection.
Periodic packet management process	periodic-packet-services	Processes a variety of time-sensitive periodic tasks so that other processes can more optimally direct their resources.
Packet Forwarding Engine process	pfed	Gathers and reports Packet Forwarding Engine statistics.
Packet gateway service process	pgcp-service or pgcpd	Configures the Packet Gateway Control Protocol (*PGCP*) that is required for the border gateway function (*BGF*) feature.
Pragmatic General Multicast process	pgm	Enables a reliable transport layer for multicast applications.

Table 3: Junos OS Routing-Specific Processes *(Continued)*

Process	Name	Description
PIC services logging process	pic-services-logging or fsad (the file system access daemon)	Enables PICs to send special logging information to the Routing Engine for archiving on the hard drive.
Point-to-Point Protocol (*PPP*) process	ppp	Enables transporting IP traffic across point-to-point links.
Universal edge PPP process	ppp-service	Enables transporting IP traffic across universal edge routers.
Point-to-Point Protocol over Ethernet process	pppoe	Allows users to connect to a network of hosts over a bridge or access concentrator.
Process health monitor process	process-monitor or pmond	Extends the SNMP *RMON* alarm infrastructure to provide predefined monitoring for a selected set of object instances (such as file system usage, CPU usage, and memory usage) and dynamic object instances (such as Junos OS processes). **NOTE**: The process health monitor process is enabled by default on the Routing Engines of MX Series routers, even when no service interfaces are configured. To disable this process, include the `disable` statement at the `[edit system processes process-monitor]` hierarchy level.
Redundancy interface management process	redundancy-interface-process	Serves as an active or backup process of an application server and can be configured to process traffic for more than one logical application server.
Remote operations process	remote-operations	Provides the *ping* and *traceroute* MIBs.

Table 3: Junos OS Routing-Specific Processes *(Continued)*

Process	Name	Description
Resource cleanup process	resource-cleanup	Enables cleaning of resources by entities other than the application itself.
Routing process	routing	Directs forwarding on the basis of routing tables, which maintain a record of the routes to various network destinations.
Traffic sampling control process	sampling	Performs packet sampling based on particular input interfaces and various fields in the packet header.
Session Border Control (*SBC*) configuration process	sbc-configuration-process	Configures the session border controller functionality that enables delivery of voice, video, and other multimedia services with assured quality and security.
SDK service process	sdk-service	Runs on the Routing Engine and enables communication between the SDK application and Junos OS. Although the SDK service process is present on the router, it is turned off by default.
Secure Neighbor Discovery (*SND*) protocol process	secure-neighbor-discovery or send	(EX Series switches and MX Series routers only) Provides support for protecting *NDP* messages.
Service Deployment System (*SDX*) process	service-deployment	Enables Junos OS to work with the Session and Resource Control (*SRC*) software.
Simple Network Management Protocol (SNMP) process	snmp	Enables the monitoring of network devices from a central location, and provides the device's SNMP primary agent.

Table 3: Junos OS Routing-Specific Processes *(Continued)*

Process	Name	Description
SONET Automatic Protection Switching (APS) process	sonet-aps	Monitors any SONET interface that participates in *APS*.
Static subscribers process	static-subscribers	Associates subscribers with statically configured interfaces, and provides dynamic service activation and activation for these subscribers.
Tunnel OAM process	tunnel-oamd	Enables the Operations, Administration, and Maintenance of Layer 2 tunneled networks.
Virtual Router Redundancy Protocol (*VRRP*) process	vrrp	(EX Series switches and MX Series routers only) Enables hosts on a LAN to make use of redundant routing platforms on that LAN without requiring more than the static configuration of a single default route on the hosts.
Watchdog timer process	watchdog	Enables the watchdog timer when Junos OS encounters a problem.

Default Directories for Junos OS File Storage on the Network Device

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- Directories on the Logical System | **23**

Generally, Junos OS files are stored in the following directories on the device:

- **/altconfig**—When you back up the currently running and active file system partitions on the device to standby partitions using the `request system snapshot` command, the **/config** directory is backed up to **/**

altconfig. Normally, the **/config** directory is on the CompactFlash card and **/altconfig** is on the hard disk.

- **/altroot**—When you back up the currently running and active file system partitions on the router to standby partitions using the `request system snapshot` command, the root file system (**/**) is backed up to **/altroot**. Normally, the root directory is on the CompactFlash card and **/altroot** is on the hard drive.
- **/config**—This directory is located on the primary boot device, that is, on the permanent storage from which the device booted (generally the CompactFlash card (device **wd0**) or internal flash storage). This directory contains the current operational router or switch configuration and the last three committed configurations, in the files **juniper.conf**, **juniper.conf.1**, **juniper.conf.2**, and **juniper.conf.3**, respectively.
- **/var**—This directory is located either on the hard drive (device **wd2**) or internal flash storage. It contains the following subdirectories:
  - **/home**—Contains users' home directories, which are created when you create user access accounts. For users using SSH authentication, their **.ssh** file, which contains their SSH key, is placed in their home directory. When a user saves or loads a configuration file, that file is loaded from the user's home directory unless the user specifies a full pathname.
  - **/db/config**—Contains up to 46 additional previous versions of committed configurations, which are stored in the files **juniper.conf.4.gz** through **juniper.conf.49.gz**.
  - **/log**—Contains system log and tracing files.
  - **/tmp**—Contains core files. The software saves up to five core files, numbered from 0 through 4. File number 0 is the oldest core file and file number 4 is the newest core file. To preserve the oldest core files, the software overwrites the newest core file, number 4, with any subsequent core file.

Each device ships with removable media (device **wfd0**) that contains a backup copy of Junos OS.

Directories on the Logical System

In addition to saving the configuration of logical systems in the current **juniper.conf** file, each logical system has an individual directory structure created in the **/var/logical-systems/*logical-system-name*** directory.

The **/var/logical-systems/*logical-system-name*** directory contains the following subdirectories:

- **/config**—Contains the current operational configuration specific to the logical system.
- **/log**—Contains system log and tracing files specific to the logical system.

To maintain backward compatibility for the log files with previous versions of Junos OS, a symbolic link (symlink) from the **/var/logs/*logical-system-name*** directory to the **/var/logical-systems/*logical-system-name*** directory is created when a logical system is configured.

- **/tmp**—Contains temporary files specific to the logical system.

This file system for each logical system enables logical system users to view trace logs and modify logical system files. Logical system administrators have full access to view and modify all files specific to the logical system.

Logical system users and administrators can save and load configuration files at the logical-system hierarchy level using the `save` and `load` configuration mode commands. In addition, they can also issue the `show log`, `monitor`, and `file` operational mode commands at the logical-system hierarchy level.

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Format for Specifying Filenames and URLs in Junos OS CLI Commands | **67**

Junos OS Support for IPv4, IPv6, and MPLS Routing Protocols

Junos OS implements full IP routing functionality, providing support for IP version 4 and IP version 6 (IPv4 and IPv6, respectively). The routing protocols are fully interoperable with existing IP routing protocols, and they have been developed to provide the scale and control necessary for the Internet core.

Junos OS supports the following unicast routing protocols:

- BGP—Border Gateway Protocol version 4 is an *EGP* that guarantees loop-free exchange of routing information between routing domains (also called autonomous systems). BGP, in conjunction with Junos OS routing policies, provides a system of administrative checks and balances that can be used to implement peering and transit agreements.
- ICMP—Internet Control Message Protocol router discovery enables hosts to discover the addresses of operational routers on the subnet.
- IS-IS—Intermediate System to Intermediate System is a link-state *IGP* for IP networks that uses the *SPF* algorithm, which also is referred to as the *Dijkstra* algorithm, to determine routes. The Junos OS supports a new and complete implementation of the protocol, addressing issues of scale, convergence, and resilience.

- OSPF—Open Shortest Path First is an IGP that was developed for IP networks by the Internet Engineering Task Force (*IETF*). OSPF is a link-state protocol that makes routing decisions based on the *SPF* algorithm.

  OSPF Version 2 supports IPv4. OSPF Version 3 supports IPv6. The fundamental mechanisms of OSPF such as flooding, designated router (*DR*) election, area-based topologies, and the *SPF* calculations remain unchanged in OSPF Version 3. Some differences exist either because of changes in protocol semantics between IPv4 and IPv6, or because of the need to handle the increased address size of IPv6.

- RIP—Routing Information Protocol version 2 is a distance-vector IGP for IP networks based on the *Bellman-Ford* algorithm. RIP dynamically routes packets between a subscriber and a service provider without the subscriber having to configure BGP or to participate in the service provider's *IGP* discovery process.

Junos OS also provides the following routing and Multiprotocol Label Switching (*MPLS*) applications protocols:

- *Unicast* routing protocols:
  - BGP
  - ICMP
  - IS-IS
  - OSPF Version 2
  - RIP Version 2
- Multicast routing protocols:
  - DVMRP—Distance Vector Multicast Routing Protocol is a *dense-mode* (*flood-and-prune*) multicast routing protocol.
  - IGMP—Internet Group Management Protocol versions 1 and 2 are used to manage membership in multicast groups.
  - MSDP—Multicast Source Discovery Protocol enables multiple Protocol Independent Multicast (*PIM*) *sparse mode* domains to be joined. A rendezvous point (*RP*) in a PIM sparse mode domain has a peer relationship with an RP in another domain, enabling it to discover multicast sources from other domains.
  - PIM sparse mode and dense mode—Protocol-Independent Multicast is a multicast routing protocol. PIM sparse mode routes to multicast groups that might span wide-area and interdomain internets. PIM dense mode is a flood-and-prune protocol.

- SAP/SDP—Session Announcement Protocol and Session Description Protocol handle conference session announcements.

- MPLS applications protocols:

  - LDP—The Label Distribution Protocol provides a mechanism for distributing labels in non-traffic-engineered applications. LDP enables routers to establish label-switched paths (LSPs) through a network by mapping network layer routing information directly to data-link layer switched paths. LSPs created by LDP can also traverse LSPs created by the Resource Reservation Protocol (*RSVP*).

  - MPLS—Multiprotocol Label Switching, formerly known as tag switching, enables you to manually or dynamically configure LSPs through a network. It lets you direct traffic through particular paths rather than rely on the IGP least-cost algorithm to choose a path.

  - RSVP—The Resource Reservation Protocol version 1 provides a mechanism for engineering network traffic patterns that is independent of the shortest path decided upon by a routing protocol. RSVP itself is not a routing protocol; it operates with current and future unicast and multicast routing protocols. The primary purpose of RSVP is to support dynamic signaling for MPLS LSPs.

RELATED DOCUMENTATION

Junos OS Overview

Junos OS Routing and Forwarding Tables

A major function of the Junos OS routing protocol process is to maintain the Routing Engine's routing tables and use these tables to determine the active routes to network destinations. The routing protocol process then installs these routes into the Routing Engine's forwarding table. The Junos OS kernel then copies this forwarding table to the Packet Forwarding Engine.

The routing protocol process maintains multiple routing tables. By default, it maintains the following three routing tables. You can configure additional routing tables to suit your requirements.

- *Unicast* routing table—Stores routing information for all unicast routing protocols running on the router. BGP, IS-IS, OSPF, and RIP all store their routing information in this routing table. You can configure additional routes, such as static routes, to be included in this routing table. BGP, IS-IS, OSPF, and RIP use the routes in this routing table when advertising routing information to their neighbors.

- Multicast routing table (cache)—Stores routing information for all the running multicast protocols. *DVMRP* and *PIM* both store their routing information in this routing table, and you can configure additional routes to be included in this routing table.
- MPLS routing table—Stores *MPLS* path and label information.

With each routing table, the routing protocol process uses the collected routing information to determine active routes to network destinations.

For *unicast* routes, the routing protocol process determines active routes by choosing the most preferred route, which is the route with the lowest preference value. By default, the route's preference value is simply a function of how the routing protocol process learned about the route. You can modify the default preference value using routing policy and with software configuration parameters.

For *multicast* traffic, the routing protocol process determines active routes based on traffic flow and other parameters specified by the multicast routing protocol algorithms. The routing protocol process then installs one or more active routes to each network destination into the Routing Engine's forwarding table.

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Routing Policy Overview

By default, all routing protocols place their routes into the *routing table*. When advertising routes, the routing protocols by default advertise only a limited set of routes from the routing table. Specifically, each routing protocol exports only the active routes that were learned by that protocol. In addition, the interior gateway protocols (IS-IS, OSPF, and RIP) export the direct (interface) routes for the interfaces on which they are explicitly configured.

You can control the routes that a protocol places into each table and the routes from that table that the protocol advertises. You do this by defining one or more routing policies and then applying them to the specific routing protocol.

Routing policies applied when the routing protocol places routes into the routing table are referred to as *import policies* because the routes are being imported into the routing table. Policies applied when the routing protocol is advertising routes that are in the routing table are referred to as *export policies* because the routes are being exported from the routing table. In other words, the terms *import* and *export* are used with respect to the routing table.

A routing policy enables you to control (filter) which routes a routing protocol imports into the routing table and which routes a routing protocol exports from the routing table. A routing policy also enables you to set the information associated with a route as it is being imported into or exported from the routing table. Filtering imported routes enables you to control the routes used to determine active routes. Filtering routes being exported from the routing table enables you to control the routes that a protocol advertises to its neighbors.

A defined routing policy specifies the conditions to use to match a route and the action to perform on the route when a match occurs. For example, when a routing table imports routing information from a routing protocol, a routing policy might modify the route's preference, mark the route with a color to identify it and allow it to be manipulated later, or prevent the route from even being installed in a routing table. When a routing table exports routes into a routing protocol, a policy might assign metric values, modify the BGP community information, tag the route with additional information, or prevent the route from being exported altogether. You also can define policies for redistributing the routes learned from one protocol into another protocol.

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Junos OS Support for IPv4, IPv6, and MPLS Routing Protocols | 24

Junos OS Support for VPNs

Junos OS supports several types of virtual private networks (*VPNs*), including:

- Layer 2 VPNs link a set of sites that share routing information, and whose connectivity is controlled by a collection of policies. A Layer 2 VPN is not aware of routes within your network. It simply provides private links between sites over the service provider's existing public Internet *backbone*.
- Layer 3 VPNs are the same as a Layer 2 VPN, but it is aware of routes within your network, requiring more configuration on the part of the service provider than a Layer 2 VPN. The sites that make up a Layer 3 VPN are connected over a service provider's existing public Internet backbone.
- An Ethernet VPN (EVPN) enables you to connect dispersed customer sites using a Layer 2 virtual bridge. As with other types of VPNs, an EVPN consists of customer edge (CE) devices (host, router, or switch) connected to provider edge (PE) routers. The PE routers can include an MPLS edge switch (MES) that acts at the edge of the MPLS infrastructure. Either an MX Series 5G Universal Routing Platform or a standalone switch can be configured to act as an MES. You can deploy multiple EVPNs within a service provider network, each providing network connectivity to a customer while ensuring that the traffic sharing on that network remains private.

- Interprovider VPNs supply connectivity between two VPNs in separate autonomous systems (*ASs*). This functionality can be used by a VPN user with connections to several Internet service providers (*ISPs*), or different connections to the same ISP in various geographic regions.
- Carrier-of-carrier VPNs allow a VPN service provider to supply VPN service to a someone who is also a service provider. The latter service provider supplies Internet or VPN service to an end user.

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Configuring FIB Localization

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FIB Localization Overview

On Juniper Networks devices, the forwarding table on the Packet Forwarding Engine, also referred to as forwarding information base (FIB), maintains the complete set of active IPv4 (inet) and IPv6 (inet6) routes. In Junos OS Release 11.4 and later, you can configure FIB localization for a Packet Forwarding Engine. FIB-localization characterizes Packet Forwarding Engines in a router as either “FIB-remote” or “FIB-local”.

FIB-local Packet Forwarding Engines install all routes from the default inet and inet6 route tables into the Packet Forwarding Engine forwarding hardware. FIB-remote Packet Forwarding Engines do not install all the routes for the inet and inet6 routing tables. However, they do maintain local and multicast routes.

FIB-remote Packet Forwarding Engines create a default (0/0) route in the Packet Forwarding Engine forwarding hardware for the inet and inet6 table. The default route references a next-hop or a unilist of next-hops that identify the FIB-local Packet Forwarding Engines that can perform full IP table lookups for received packets.

FIB-remote Packet Forwarding Engines forward received packets to the set of FIB-local Packet Forwarding Engines. The FIB-local Packet Forwarding Engines then perform full IP longest-match lookup

on the destination address and forward the packet appropriately. The packet might be forwarded out of an egress interface on the same FIB-local Packet Forwarding Engine that performed the lookup or an egress interface on a different FIB-local or FIB-remote Packet Forwarding Engine. The packet might also be forwarded out of an FPC where FIB localization is not configured. The packet might also be received locally at the Routing Engine.

When FIB localization is configured on a router with some Flexible PIC Concentrators (FPCs) being FIB-remote and some others being FIB-local, packets arriving on the interface of the FIB-remote FPC are forwarded to one of the FIB-local FPCs for route lookup and forwarding.

The advantage of configuring FIB localization is that it enables upgrading the hardware forwarding table capacity of FIB-local Packet Forwarding Engines while not requiring upgrades to the FIB-remote Packet Forwarding Engines. In a typical network deployment, FIB-local Packet Forwarding Engines are core-facing, while FIB-remote Packet Forwarding Engines are edge-facing. The FIB-remote Packet Forwarding Engines also load-balance traffic over the available set of FIB-local Packet Forwarding Engines.

FIB localization is currently supported on specific Junos OS devices, including the T320, T640, T1600, and MX Series routers. To see if your hardware supports FIB localization, see the Juniper Networks Feature Explorer.

NOTE: On MX Series routers, you can configure multiservices Dense Port Concentrators (DPCs) as FIB-remote. However, only Modular Port Concentrators (MPCs) can be configured as FIB-local. FIB-localization is supported only for redundant link services intelligent queuing interfaces that carry Multilink Point-to-Point Protocol (MLPPP) traffic.

Example: Configuring Packet Forwarding Engine FIB Localization

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This example shows how to configure Packet Forwarding Engine FIB localization.

Requirements

Before you begin:

1. Configure device interfaces and loopback interface addresses.
2. Configure static routes.
3. Configure OSPF and OSPFv3 and make sure that OSPF adjacencies and OSPF routes to loopback addresses are established.

This example uses the following hardware and software components:

- A T320, T640,T1600, or MX Series router.
- Junos OS Release 11.4 or later running on the router for T-Series routers. Junos OS Release 12.3 or later running on the router for MX Series routers.

Overview

In this example, you configure the chassis for IPv4 and IPv6 routes and FIB localization on Router R0 and then configure the edge-facing Packet Forwarding Engines on FPC0 as `fib-remote` and the core-facing Packet Forwarding Engines on FPC1 and FPC2 as `fib-local`. You then configure a routing policy named `fib-policy` with the `no-route-localize` option to ensure that all routes from a specified route filter are installed on the FIB-remote FPC.

Configuration

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Procedure

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, and then copy and paste the commands into the CLI at the `[edit]` hierarchy level.

NOTE: Configuring FIB local results in a reboot of the related line card to activate the changes.

R0

```
set chassis fpc 0 route-localization fib-remote
set chassis fpc 1 route-localization fib-local
set chassis fpc 2 route-localization fib-local
set chassis route-localization inet
set chassis route-localization inet6
set policy-options policy-statement fib-policy term a from route-filter 10.4.4.4/32 exact
set policy-options policy-statement fib-policy term a then no-route-localize
set policy-options policy-statement fib-policy term b from route-filter fec0:4444::4/128 exact
set policy-options policy-statement fib-policy term b then no-route-localize
set policy-options policy-statement fib-policy then accept
set routing-options forwarding-table export fib-policy
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For information about navigating the Junos OS CLI, see the Junos OS CLI User Guide.

To configure Packet Forwarding Engine FIB localization:

1. Configure route localization or FIB localization for IPv4 and IPv6 traffic.

```
[edit chassis]
user@R0# set route-localization inet
user@R0# set route-localization inet6
```

2. Configure the Packet Forwarding Engine of an FPC as either `fib-local` or `fib-remote`.

```
[edit chassis]
user@R0# set fpc 0 route-localization fib-remote
user@R0# set fpc 1 route-localization fib-local
user@R0# set fpc 2 route-localization fib-local
```

3. Configure the routing policy by including the `no-route-localize` statement to enable the forwarding table policy to mark route prefixes such that the routes are installed into forwarding hardware on the FIB-remote Packet Forwarding Engines.

```
[edit policy-options]
user@R0# set policy-statement fib-policy term a from route-filter 10.4.4.4/32 exact
user@R0# set policy-statement fib-policy term a then no-route-localize
user@R0# set policy-statement fib-policy term b from route-filter fec0:4444::4/128 exact
user@R0# set policy-statement fib-policy term b then no-route-localize
user@R0# set policy-statement fib-policy then accept
```

4. Enable the routing policy in the forwarding table by configuring the forwarding table with the `fib-policy` statement.

```
[edit routing-options]
user@R0# set forwarding-table export fib-policy
```

NOTE: At least, one Packet Forwarding Engine must be configured as `fib-local` for the commit operation to be successful. If you do not configure `fib-local` for the Packet Forwarding Engine, the CLI displays an appropriate error message and the commit fails.

Results

From configuration mode, confirm your configuration by entering the `show chassis` and `show policy-options` commands. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
user@R0# show chassis
fpc 0 {
    route-localization fib-remote;
}
fpc 1 {
    route-localization fib-local;
}
fpc 2 {
    route-localization fib-local;
}
route-localization {
```

```
    inet;
    inet6;
}
```

```
user@R0# show policy-options
policy-statement fib-policy {
    term a {
        from {
            route-filter 10.4.4.4/32 exact;
        }
        then no-route-localize;
    }
    term b {
        from {
            route-filter fec0:4444::4/128 exact;
        }
        then no-route-localize;
    }
    then accept;
    }
}
```

Verification

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- Verifying Routes After the Policy Is Applied | 36

Confirm that the configuration is working properly.

Verifying Policy Configuration

Purpose

Verify that the configured policy exists.

Action

Issue the `show policy fib-policy` command to check that the configured policy `fib-policy` exists.

```
user@R0> show policy fib-policy
Policy fib-policy:
    Term a:
        from
             route filter:
                 10.4.4.4/32 exact
        then no-route-localize
    Term b:
        from
             route filter:
                 fec0:4444::4/128 exact
        then no-route-localize
    Term unnamed:
        then accept
```

Verifying FIB-Localization Configuration

Purpose

Verify FIB-localization configuration details by using the `show route localization` and `show route localization detail` commands.

Action

```
user@R0> show route localization
FIB localization ready FPCs (and FIB-local Forwarding Engine addresses)
  FIB-local:  FPC2(4,5)
```

```
  FIB-remote: FPC0, FPC1
  Normal:     FPC3, FPC4, FPC5, FPC6, FPC7
```

```
user@R0> show route localization detail
FIB localization ready FPCs (and FIB-local Forwarding Engine addresses)
  FIB-local:  FPC2(4,5)
  FIB-remote: FPC0, FPC1
  Normal:     FPC3, FPC4, FPC5, FPC6, FPC7
FIB localization configuration
  Protocols:  inet, inet6
  FIB-local:  FPC2
  FIB-remote: FPC0, FPC1
Forwarding Engine addresses
  FPC0: 1
  FPC1: 2
  FPC2: 4, 5
  FPC3: 6
  FPC4: 8
  FPC5: 11
  FPC6: 13
  FPC7: 15
```

Verifying Routes After the Policy Is Applied

Purpose

Verify that routes with the `no-route-localize` policy option are installed on the `fib-remote` FPC.

Action

```
user@R0> show route 10.4.4.4/32 extensive
```

```
inet.0: 30 destinations, 30 routes (29 active, 0 holddown, 1 hidden)
10.4.4.4/32 (1 entry, 1 announced)
TSI:
KRT in-kernel 10.4.4.4/32 -> {10.130.0.2 Flags no-localize}
                                          ^^^^^^^^^^^^^^^^^
```

```
        *Static Preference: 5
                Next hop type: Router, Next hop index: 629
                Next-hop reference count: 3
                Next hop: 10.130.0.2 via ge-1/0/4.0, selected
                State: <Active Int="">
                         Age: 10:33
                         Task: RT
                         Announcement bits (1): 0-KRT
                         AS path: I</Active
>
```

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- no-route-localize | **118**
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CHAPTER 2

Junos OS Security Overview

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Junos OS Features for Device Security

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Device security consists of three major elements: Physical security of the hardware, operating system security, and security that can be affected through configuration.

Physical security involves restricting access to the device. Exploits that can easily be prevented from remote locations are extremely difficult or impossible to prevent if an attacker can gain access to the device's management port or console. The inherent security of Junos OS also plays an important role in router security. Junos OS is extremely stable and robust, and provides features to protect against attacks, allowing you to configure the device to minimize vulnerabilities.

The following are Junos OS features available to improve device security:

Methods of Remote Access for Device Management

When you first install Junos OS, all remote access to the device is disabled, thereby ensuring that remote access is possible only if deliberately enabled by an authorized user. You can establish remote communication with a device in one of the following ways:

- Out-of-band management: Enables connection to the device through an interface dedicated to device management. Juniper Networks devices support out-of-band management with a dedicated management Ethernet interface, as well as EIA-232 console and auxiliary ports. On all devices other than the TX Matrix Plus, T1600, T1600 or T4000 devices connected to a TX Matrix Plus device in a routing matrix, and PTX Series Packet Transport Routers, the management interface is fxp0. On a TX Matrix Plus, T1600, T1600 or T4000 devices in a routing matrix, and PTX Series Packet Transport Routers, the management Ethernet Interface is labeled em0. The management Ethernet interface connects directly to the Routing Engine. No transit traffic is allowed through this interface, providing complete separation of customer and management traffic and ensuring that congestion or failures in the transit network do not affect the management of the device.

- Inband management: Enables connection to the devices using the same interfaces through which customer traffic flows. Although this approach is simple and requires no dedicated management resources, it has two disadvantages:

    - Management flows and transit traffic flows are mixed together. Any attack traffic that is mixed with the normal traffic can affect the communication with the device.

    - The links between device components might not be totally trustworthy, leading to the possibility of wiretapping and replay attacks.

For management access to the device, the standard ways to communicate with the device from a remote console are with Telnet and SSH. SSH provides secure encrypted communications and is therefore useful for inband device management. Telnet provides unencrypted, and therefore less secure, access to the device.

Junos OS Supported Protocols and Methods for User Authentication

On a device, you can create local user login accounts to control who can log in to the device and the access privileges they have. A password, either an SSH key or a Message Digest 5 (MD5) password, is associated with each login account. To define access privileges, you create login classes into which you group users with similar jobs or job functions. You use these classes to explicitly define what commands their users are and are not allowed to issue while logged in to the device.

The management of multiple devices by many different personnel can create a user account management problem. One solution is to use a central authentication service to simplify account management, creating and deleting user accounts only on a single, central server. A central authentication system also simplifies the use of one-time password systems such as SecureID, which

offer protection against password sniffing and password replay attacks (attacks in which someone uses a captured password to pose as a device administrator).

Junos OS supports two protocols for central authentication of users on multiple devices:

- Terminal Access Controller Access Control System Plus (TACACS+).
- Remote Authentication Dial-In User Service (RADIUS), a multivendor IETF standard whose features are more widely accepted than those of TACACS+ or other proprietary systems. All one-time-password system vendors support RADIUS.

Junos OS also supports the following authentication methods:

- Internet Protocol Security (IPsec). IPsec architecture provides a security suite for the IPv4 and IPv6 network layers. The suite provides such functionality as authentication of origin, data integrity, confidentiality, replay protection, and nonrepudiation of source. In addition to IPsec, Junos OS supports the Internet Key Exchange (IKE), which defines mechanisms for key generation and exchange, and manages security associations (SAs).
- MD5 authentication of MSDP peering sessions. This authentication provides protection against spoofed packets being introduced into a peering session.
- SNMPv3 authentication and encryption. SNMPv3 uses the user-based security model (USM) for message security and the view-based access control model (VACM) for access control. USM specifies authentication and encryption. VACM specifies access-control rules.

Junos OS Plain-Text Password Requirements

Junos OS has special requirements when you create plain-text passwords on a device. The default requirements for plain-text passwords are as follows:

- The password must be between 6 and 128 characters long.
- You can include uppercase letters, lowercase letters, numbers, punctuation marks, and any of the following special characters:
  ! @ # $ % ^ & * , + = < > : ;
  Control characters are not recommended.
- The password must contain at least one change of case or character class.

You can change the requirements for plain-text passwords.

You can include the `plain-text-password` statement at the following hierarchy levels:

- `[edit system diag-port-authentication]`
- `[edit system pic-console-authentication]`

- `[edit system root-authentication]`
- `[edit system login user` *`username`* `authentication]`

Junos OS Support for Routing Protocol Security Features and IPsec

The main task of a device is to forward user traffic toward its intended destination based on the information in the device's routing and forwarding tables. You can configure routing policies that define the flows of routing information through the network, controlling which routes the routing protocols place in the routing tables and which routes they advertise from the tables. You can also use routing policies to change specific route characteristics, change the BGP route flap-damping values, perform per-packet load balancing, and enable *class of service* (CoS).

Attackers can send forged protocol packets to a device with the intent of changing or corrupting the contents of its routing table or other databases, which can degrade the functionality of the device. To prevent such attacks, you must ensure that devices form routing protocol peering or neighboring relationships with trusted peers. One way to do this is by authenticating routing protocol messages. The Junos OS BGP, IS-IS, OSPF, RIP, and RSVP protocols all support HMAC-MD5 authentication, which uses a secret key combined with the data being protected to compute a hash. When the protocols send messages, the computed hash is transmitted with the data. The receiver uses the matching key to validate the message hash.

Junos OS supports the IPsec security suite for the IPv4 and IPv6 network layers. The suite provides such functionality as authentication of origin, data integrity, confidentiality, replay protection, and nonrepudiation of source. Junos OS also supports IKE, which defines mechanisms for key generation and exchange, and manages SAs.

Junos OS Support for Firewall Filters

Firewall filters allow you to control packets transiting the device to a network destination and packets destined for and sent by the device. You can configure firewall filters to control which data packets are accepted on and transmitted from the physical interfaces, and which local packets are transmitted from the physical interfaces and the Routing Engine. Firewall filters provide a means of protecting your device from excessive traffic. Firewall filters that control local packets can also protect your device from external aggressions, such as DoS attacks.

To protect the Routing Engine, you can configure a *firewall filter* only on the device's loopback interface. Adding or modifying filters for each interface on the device is not necessary. You can design firewall filters to protect against ICMP and Transmission Control Protocol (TCP) connection request (SYN) floods and to rate-limit traffic being sent to the Routing Engine.

Junos OS Support Distributed Denial-of-Service Protection

A denial-of-service attack is any attempt to deny valid users access to network or server resources by using up all the resources of the network element or server. Distributed denial-of-service attacks involve an attack from multiple sources, enabling a much greater amount of traffic to attack the network. The attacks typically use network protocol control packets to trigger a large number of exceptions to the device's control plane. This results in an excessive processing load that disrupts normal network operations.

Junos OS DDoS protection enables the device to continue functioning while under an attack. It identifies and suppresses malicious control packets while enabling legitimate control traffic to be processed. A single point of DDoS protection management enables network administrators to customize profiles for their network control traffic. Protection and monitoring persists across graceful Routing Engine switchover (GRES) and unified in-service-software-upgrade (ISSU) switchovers. Protection is not diminished as the number of subscribers increases.

To protect against DDoS attacks, you can configure policers for host-bound exception traffic. The policers specify rate limits for individual types of protocol control packets or for all control packet types for a protocol. You can monitor policer actions for packet types and protocol groups at the level of the device, Routing Engine, and line cards. You can also control logging of policer events.

Flow detection is an enhancement to DDoS protection that supplements the DDoS policer hierarchies by using a limited amount of hardware resources to monitor the arrival rate of host-bound flows of control traffic. Flow detection is much more scalable than a solution based on filter policers. Filter policers track all flows, which consumes a considerable amount of resources. In contrast, flow detection only tracks flows it identifies as suspicious, using far fewer resources to do so.

The flow detection application has two interrelated components, detection and tracking. Detection is the process where flows suspected of being improper are identified and subsequently controlled. Tracking is the process where flows are tracked to determine whether they are truly hostile and when these flows recover to within acceptable limits.

Junos OS Auditing Support for Security

Junos OS logs significant events that occur on the device and within the network. Although logging itself does not increase security, you can use the system logs to monitor the effectiveness of your security policies and device configurations. You can also use the logs when reacting to a continued and deliberate attack as a means of identifying the source address, device, or port of the attacker's traffic. You can configure the logging of different levels of events, from only critical events to all events, including informational events. You can then inspect the contents of the system log files either in real time or later.

Debugging and troubleshooting are much easier when the timestamps in the system log files of all devices are synchronized, because events that span the network might be correlated with synchronous

entries in multiple logs. Junos OS supports the Network Time Protocol (NTP), which you can enable on the device to synchronize the system clocks of devices and other networking equipment. By default, NTP operates in an unauthenticated mode. You can configure various types of authentication, including an HMAC-MD5 scheme.

RELATED DOCUMENTATION

> *Overview of IPsec*
>
> *Junos OS System Log Overview*

Junos OS Default Settings for Device Security

Junos OS protects against common network device security weaknesses with the following default settings:

- Junos OS does not forward directed broadcast messages. Directed broadcast services send ping requests from a spoofed source address to a broadcast address and can be used to attack other Internet users. For example, if broadcast ping messages were allowed on the 200.0.0.0/24 network, a single ping request could result in up to 254 responses to the supposed source of the ping. The source would actually become the victim of a denial-of-service (DoS) attack.
- Generally, by default, only console access to the device is enabled. Remote management access to the device and all management access protocols, including Telnet, FTP, and SSH (Secure Shell), are disabled by default, unless the device setup specifically includes a factory-installed DHCP configuration.
- Junos OS does not support the SNMP set capability for editing configuration data. Although the software supports the SNMP set capability for monitoring and troubleshooting the network, this support exposes no known security issues. (You can configure the software to disable this SNMP set capability.)
- Junos OS ignores martian (intentionally non-routable) IP addresses that contain the following prefixes: 0.0.0.0/8, 127.0.0.0/8, 128.0.0.0/16, 191.255.0.0/16, 192.0.0.0/24, 223.255.55.0/24, and 240.0.0.0/4. Martian addresses are reserved host or network addresses about which all routing information should be ignored.

CHAPTER 3

Junos OS Configuration Overview

IN THIS CHAPTER

- Junos OS Configuration Basics | 44
- Methods for Configuring Junos OS | 45
- Junos OS Configuration from External Devices | 48
- The Commit Model for Configurations | 48
- Configuration Groups Overview | 50

Junos OS Configuration Basics

Usually, your Juniper Networks device comes with Junos OS installed on it, unless you specifically order it without the operating system. When Junos OS is pre-installed, you simply power on the device and all software starts automatically. You just need to configure the device so it will be ready to participate in the network.

To configure the Junos OS, you must specify a hierarchy of configuration statements which define the preferred software properties. You can configure all properties of the Junos OS, including interfaces, general routing information, routing protocols, and user access, as well as some system hardware properties. After you have created a candidate configuration, you commit the configuration to be evaluated and activated by Junos OS.

RELATED DOCUMENTATION

Junos OS Configuration from External Devices | 48

Methods for Configuring Junos OS | 45

Initial Router or Switch Configuration Using Junos OS | 53

Methods for Configuring Junos OS

IN THIS SECTION

- Junos OS Command-Line Interface | 46
- ASCII File | 46
- J-Web Package | 46
- Junos XML Management Protocol Software | 47
- NETCONF XML Management Protocol Software | 47
- Configuration Commit Scripts | 47

Depending on specific device support, you can use the methods shown in Table 4 on page 45 to configure Junos OS. For more information, see the Juniper Networks Feature Explorer.

Table 4: Methods for Configuring Junos OS

Method	Description
Command-line interface (CLI)	Create the configuration for the device using the CLI. You can enter commands from a single command line, and scroll through recently executed commands.
ASCII file	Load an ASCII file containing a configuration that you created earlier, either on this system or on another system. You can then activate and run the configuration file, or you can edit it using the CLI and then activate it.
J-Web graphical user interface (GUI)	Use the J-Web GUI to configure the device. J-Web enables you to monitor, configure, troubleshoot, and manage the router on a client by means of a Web browser. The J-Web GUI is supported on only certain Juniper Networks devices. For more information, see the Juniper Networks Feature Explorer.
Junos XML management protocol (API)	Client applications use the Junos XML management protocol to monitor and configure Juniper Networks devices. The Junos XML management protocol is customized for Junos OS, and operations in the API are equivalent to those in the CLI.

Table 4: Methods for Configuring Junos OS *(Continued)*

Method	Description
NETCONF application programming interface (API)	Client applications use the NETCONF XML management protocol to monitor and configure supported devices. The NETCONF XML management protocol includes features that accommodate the configuration data models of multiple vendors.
Configuration commit scripts	Create scripts that run at commit time to enforce custom configuration rules. Commit scripts are written in Python, Stylesheet Language Alternative syntaX (SLAX), or Extensible Stylesheet Language Transformations (XSLT).

The following sections describe the methods you can use to configure Junos OS:

Junos OS Command-Line Interface

The Junos OS CLI is a straightforward terminal-based command interface. You use Emacs-style keyboard sequences to move around on a command line and scroll through a buffer that contains recently executed commands. You type commands on a single line, and the commands are executed when you press the Enter key. The CLI also provides command help and command completion.

ASCII File

You can load an ASCII file containing a configuration that you created earlier, either on this system or another system. You can then activate and run the configuration file as is, or you can edit it using the CLI and then activate it.

J-Web Package

As an alternative to entering CLI commands, Junos OS supports the J-Web GUI. The J-Web user interface enables you to monitor, configure, troubleshoot, and manage the router on a client by means of a Web browser with Hypertext Transfer Protocol (HTTP) or HTTP over Secure Sockets Layer (HTTPS) enabled.

The J-Web user interface is an optional, licensed software package (jweb package) on M Series and TSeries routers. The jweb package is not included in jinstall and jbundle software bundles. It must be installed separately. To install the package on M Series and T Series routers, follow the procedure described in the Software Installation and Upgrade Guide.

J-Web supports weak (56-bit) encryption by default. This enables non-US customers to install J-Web and use HTTPS connections for J-Web access. US customers can also install the jcrypto strong encryption package. This package automatically overrides the weak encryption.

NOTE: Because the J-Web package is bundled separately from other packages, it is possible to have a version mismatch between J-Web and other Junos OS packages you have installed.

To check for a version mismatch, use the `show system alarms` CLI command. If the version number does not match exactly, a system alarm appears.

Junos XML Management Protocol Software

The Junos XML Management Protocol is an XML-based protocol that client applications use to monitor and configure Juniper Networks devices. It uses an XML-based data encoding for the configuration data and remote procedure calls. This API is customized for Junos OS, and operations in the API are equivalent to CLI commands.

NETCONF XML Management Protocol Software

The NETCONF XML management protocol is an XML-based protocol that client applications use to monitor and configure network devices. It uses an XML-based data encoding for the configuration data and remote procedure calls. NETCONF includes features that accommodate the configuration data models of multiple vendors. Juniper Networks provides a set of Perl modules that enable Perl client applications to communicate with the NETCONF server on Junos devices. The Perl modules enable you to develop custom applications for configuring and monitoring Junos devices.

Configuration Commit Scripts

You can create and use scripts that run at commit time to enforce custom configuration rules. If a configuration breaks the custom rules, the script can generate actions that the Junos OS performs. These actions include:

- Generating custom error messages
- Generating custom warning messages
- Generating custom system log messages
- Making changes to the configuration

Configuration commit scripts also enable you to create macros, which expand simplified custom aliases for frequently used configuration statements into standard Junos OS configuration statements. Commit scripts are written in Python, Stylesheet Language Alternative syntaX (SLAX), or Extensible Stylesheet Language Transformations (XSLT).

RELATED DOCUMENTATION

- CLI Explorer
- CLI User Guide
- Junos OS Automation Scripting User Guide
- Junos OS Configuration from External Devices | 48
- NETCONF XML Management Protocol Developer Guide
- Software Installation and Upgrade Guide

Junos OS Configuration from External Devices

You can configure Junos OS network device from a *system console* connected to the console port or by using *Telnet* to access the device remotely. External management hardware can be connected to the Routing Engine and the Junos OS through these ports:

- Console port
- Auxiliary port
- Ethernet management port

NOTE: See hardware guide for your particular Junos OS device for instructions about how to connect external hardware to the console, auxiliary, and/or Ethernet management ports. Capabilities and features can vary depending on device model.

RELATED DOCUMENTATION

- Methods for Configuring Junos OS | 45
- Configuring Junos OS to Set Console and Auxiliary Port Properties | 73

The Commit Model for Configurations

The device configuration is saved using a commit model—a candidate configuration is modified as desired and then committed to the system. When a configuration is committed, the device checks the configuration for syntax errors, and if no errors are found, the configuration is saved as **juniper.conf.gz** and activated. The formerly active configuration file is saved as the first rollback configuration file

(**juniper.conf.1.gz**), and any other rollback configuration files are incremented by 1. For example, **juniper.conf.1.gz** is incremented to **juniper.conf.2.gz**, making it the second rollback configuration file. The device can have a maximum of 49 rollback configurations (numbered 1 through 49) saved on the system.

On the device, the current configuration file and the first three rollback files (**juniper.conf.gz.1, juniper.conf.gz.2, juniper.conf.gz.3**) are located in the **/config** directory. (The remaining rollback files, 4 through 49, are located in **/var/db/config**.)

If the recovery configuration file **rescue.conf.gz** exists, this file is also located in the **/config** directory. The factory default files are located in the **/etc/config** directory.

There are two mechanisms used to propagate the configurations between Routing Engines within a device:

- Synchronization: Propagates a configuration from one Routing Engine to a second Routing Engine within the same device chassis.

  To synchronize configurations, use the `commit synchronize` CLI command. If one of the Routing Engines is locked, the synchronization fails. If synchronization fails because of a locked configuration file, you can use the `commit synchronize force` command. This command overrides the lock and synchronizes the configuration files.

- Distribution: Propagates a configuration across the routing plane on a multichassis device. Distribution occurs automatically. There is no user command available to control the distribution process. If a configuration is locked during a distribution of a configuration, the locked configuration does not receive the distributed configuration file, so the synchronization fails. You need to clear the lock before the configuration and resynchronize the routing planes.

  NOTE: When you use the `commit synchronize force` CLI command on a multichassis platform, the forced synchronization of the configuration files does not affect the distribution of the configuration file across the routing plane. If a configuration file is locked on a device remote from the device where the command was issued, the synchronization fails on the remote device. You need to clear the lock and reissue the `synchronization` command.

RELATED DOCUMENTATION

Configuring Junos OS for the First Time on a Device with a Single Routing Engine

Configuration Groups Overview

IN THIS SECTION

- How Configuration Groups Work | 50
- Inheritance Model | 50
- Configure Configuration Groups | 51

This topic provides an overview of configuration groups and the inheritance model in the Junos OS CLI.

How Configuration Groups Work

Configuration groups enable you to create a group containing configuration statements and to direct the inheritance of that group's statements in the rest of the configuration. The same group can be applied to different sections of the configuration. Different sections of one group's configuration statements can be inherited in different places in the configuration.

Configuration groups enable you to create smaller, more logically constructed configuration files, making it easier to configure and maintain Juniper Networks devices. For example, you can group statements that are repeated in many places in the configuration, such as when configuring interfaces. By grouping statements, you can limit configuration updates to just the group.

You can also use wildcards in a configuration group. Any object that matches the wildcard expression inherits the group configuration data.

The configuration group mechanism is separate from the grouping mechanisms used elsewhere in the configuration, such as BGP groups. Configuration groups provide a generic mechanism that you can use throughout the configuration but that are known only to the CLI. The individual software processes that perform the actions directed by the configuration receive the expanded form of the configuration; they have no knowledge of configuration groups.

Inheritance Model

Configuration groups use true inheritance, which involves a dynamic, ongoing relationship between the source of the configuration data and the target of that data. The target automatically inherits data values that you change in the configuration group. The target does not need to contain the inherited information. However, the inherited values can be overridden in the target without affecting the source from which they were inherited.

This inheritance model enables you to see only the instance-specific information without seeing the inherited details. A command pipe in configuration mode enables you to display the inherited data.

Configure Configuration Groups

For areas of your configuration to inherit configuration statements, you must first put the statements into a configuration group. You then apply that group to the levels in the configuration hierarchy that require the statements.

For areas of your configuration to inherit configuration statements:

1. Configure statements into a configuration group. To configure configuration groups and inheritance, you can include the groups statement at the [edit] hierarchy level:

```
[edit]
groups {
    group-name {
        configuration-data;
    }
}
```

2. Apply the configuration group from step 1 to the levels in the configuration hierarchy that require the statements.

   Include the `apply-groups [ group-names ]` statement anywhere in the configuration where the configuration statements contained in a configuration group are needed.

PART 2

Configuring and Administering Junos Devices

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CHAPTER 4

Configuring Junos Devices

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Initial Router or Switch Configuration Using Junos OS

This topic provides an overview of initial network device configuration tasks using Junos OS.

When you turn on a device for the first time, Junos OS automatically boots and starts. You must enter basic configuration information so the device is on the network and you can log in to it over the network.

To configure the device initially, you must connect through the console port.

When you first connect to the console of a device that has not yet been configured, log in as the user `root`. At first, the root account requires no password. You can see that you are the user `root`, because the command prompt shows the username `root@#`.

You must start the Junos OS command-line interface (CLI) using the command `cli`. The command prompt `root@>` indicates that you are the user `root` and that you are in Junos OS operational mode. Enter Junos OS configuration mode by typing the command `configure`. The command prompt `root@#` indicates that you are in the Junos OS configuration mode.

When you first configure a device, you should configure the following basic properties:

- Device hostname
- Domain name
- IP address of the device management Ethernet interface. To find the management Ethernet interface that you should use for configuration, see Supported Routing Engines by Router.
- IP address of a backup router
- IP address of one or more DNS name servers on your network
- Password for the root account

RELATED DOCUMENTATION

Configuring Junos OS for the First Time on a Device with a Single Routing Engine | 54

Configuring Junos OS for the First Time on a Device with Dual Routing Engines | 59

Supported Routing Engines by Router

Junos OS Configuration Using the CLI

Configuring Junos OS for the First Time on a Device with a Single Routing Engine

To configure the Junos OS for the first time on a router with a single Routing Engine and no base configuration, follow these steps:

1. Connect to the device through the console port.
2. Power on the device and wait for it to boot.

   The Junos OS boots automatically. The boot process is complete when you see the `login:` prompt on the console.
3. Log in as the user `root`.

   Initially, the `root` user account requires no password. You can see that you are the `root` user, because the prompt on the device shows the username `root@#`.

4. Start the Junos OS command-line interface (CLI):

```
root@# cli
root@>
```

5. Enter Junos OS configuration mode:

```
cli> configure
[edit]
root@#
```

6. Configure the hostname of the device. We do not recommend spaces in the router name. However, if the name does include spaces, enclose the entire name in quotation marks (" ").

```
[edit]
root@# set system host-name hostname
```

7. Set the root password, entering either a clear-text password that the system will encrypt, a password that is already encrypted, or an SSH public key string.

   Choose one of the following:

   a. To enter a clear-text password, use the following command:

```
[edit]
root@# set system root-authentication plain-text-password
New password: type password
Retype new password: retype password
```

   b. To enter a password that is already encrypted, use the following command:

```
[edit]
root@# set system root-authentication encrypted-password encrypted-password
```

   c. To enter an SSH public key, use the following command:

```
[edit]
root@# set system root-authentication ssh-rsa key
```

8. Configure the device domain name:

```
[edit]
root@# set system domain-name domain-name
```

> **NOTE**: Before you begin the next step, see Supported Routing Engines by Router to find the management Ethernet interface that you should use to perform this configuration.

9. Configure the IP address and prefix length for the device management Ethernet interface. The management Ethernet interface provides a separate out-of-band management network for the device.

   - For devices that use management Ethernet interface fxp0:

```
[edit]
root@# set interfaces fxp0 unit 0 family inet address address/prefix-length
```

   - For devices that use management Ethernet interface em0:

```
[edit]
root@# set interfaces em0 unit 0 family inet address address/prefix-length
```

10. Configure the IP address of a backup or default network device. Choose a device that is directly connected to the local router by way of the management interface. This backup is used only when it is booting and only or when the Junos routing software (the routing protocol process, rpd) is not running.

    For devices with two Routing Engines, the backup Routing Engine, `RE1`, uses the backup device as a default gateway after the device boots. This enables you to access the backup Routing Engine. (`RE0` is the default primary Routing Engine.)

> **NOTE**: The backup Routing Engine does not support more than 16 backup routing destinations. If you configure more than 16 destinations on the backup Routing Engine, the

Junos OS ignores any destination addresses after the sixteenth address and displays a commit-time warning message to this effect.

```
[edit]
root@# set system backup-router address
```

11. Configure the IP address of a DNS server. The router uses the DNS name server to translate hostnames into IP addresses.

```
[edit]
root@# set system name-server address
```

12. Optionally, display the configuration statements:

```
[edit]
root@ show
system {
    host-name hostname;
    domain-name domain.name;
    backup-router address;
    root-authentication {
        (encrypted-password "password" | public-key);
        ssh-dsa "public-key";
        ssh-ecdsa "public-key";
        ssh-rsa "public-key";
    }
    name-server {
        address;
    }
    interfaces {
        fxp0 {
            unit 0 {
                family inet {
                    address address ;
                }
            }
        }
    }
}
```

On devices that use management Ethernet interface em0, you will see em0 in place of fxp0 in the `show` command output.

13. Commit the configuration, which activates the configuration on the device:

```
[edit]
root@# commit
```

After committing the configuration, you see the newly configured hostname appear after the username in the prompt—for example, `user@hostname#`.

A basic configuration for Junos OS is now set on the device.

If you want to configure additional Junos OS properties at this time, remain in the CLI configuration mode and add the necessary configuration statements. You need to commit your configuration changes to activate them on the device.

14. Exit from the CLI configuration mode.

```
[edit]
root@hostname# exit
root@hostname>
```

15. Back up the configuration.

After you have committed the configuration and are satisfied that the new configuration is successfully running, you should issue the `request system snapshot` command to back up the new software to the **/altconfig** file system. If you do not issue the `request system snapshot` command, the configuration on the alternate boot device will be out of sync with the configuration on the primary boot device.

The `request system snapshot` command causes the root file system to be backed up to **/altroot**, and **/config** to be backed up to **/altconfig**. The root and **/config** file systems are on the device's CompactFlash card, and the **/altroot** and **/altconfig** file systems are on the device's hard drive.

NOTE: After you issue the `request system snapshot` command, you cannot easily return to the previous configuration, because the running copy and the backup copies are identical.

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Supported Routing Engines by Router

Format for Specifying IP Addresses, Network Masks, and Prefixes in Junos OS Configuration Statements | 66

Default Directories for Junos OS File Storage on the Network Device | 22

Configuring Automatic Mirroring of the CompactFlash Card on the Hard Drive | 69

Configuring Junos OS for the First Time on a Device with Dual Routing Engines

If a device has dual Routing Engines, you can create configuration groups and use the same configuration for both Routing Engines. This ensures that the configuration will not change during a failover scenario because of the identical configuration shared between the Routing Engines.

Configure the hostnames and addresses of the two Routing Engines using configuration groups at the `[edit groups]` hierarchy level. Use the reserved configuration group `re0` for the Routing Engine in slot 0 and `re1` for the Routing Engine in slot 1 to define Routing Engine-specific parameters. Configuring `re0` and `re1` groups enables both Routing Engines to use the same configuration file.

Use the `apply-groups` statement to apply the apply the configuration to the device.

The `commit synchronize` command commits the same configuration on both Routing Engines. The command makes the active or applied configuration the same for both Routing Engines with the exception of the groups, `re0` being applied to only `RE0` and `re1` being applied only to `RE1`. If you do not synchronize the configurations between two Routing Engines and one of them fails, the router may not forward traffic correctly, because the backup Routing Engine may have a different configuration.

To initially configure a device with dual Routing Engines that have no base configuration, follow these steps:

1. If you have not already done so, refer "Configuring Junos OS for the First Time on a Device with a Single Routing Engine" on page 54 and follow the steps to initially configure the backup Routing Engine.
2. Create the configuration group `re0`. The `re0` group is a special group designator that is only used by `RE0` in a redundant routing platform.

```
[edit]
root@host# set groups re0
```

3. Navigate to the `groups re0` level of the configuration hierarchy.

```
[edit]
root@host# edit groups re0
```

4. Specify the device hostname.

```
[edit groups re0]
root@host# set system host-name host-name
```

> **NOTE**: The hostname specified in the device configuration is not used by the DNS server to resolve to the correct IP address. This hostname is used to display the name of the Routing Engine in the CLI. For example, the hostname appears at the command-line prompt when you are logged in to the CLI:
>
> *user-name@host-name>*

> **NOTE**: Before you begin the next step, see Supported Routing Engines by Router to find the management Ethernet interface that you should use to perform this configuration.

5. Configure the IP address and prefix length for the device management Ethernet interface. The management Ethernet interface provides a separate out-of-band management network for the device.

   - For devices using the management Ethernet interface fxp0:

```
[edit groups]
root@host# set interfaces fxp0 unit 0 family inet address address/prefix-length
```

   - For devices that use the management Ethernet interface em0:

```
[edit groups]
root@host# set interfaces em0 unit 0 family inet address address/prefix-length
```

6. Set the loopback interface address for the `re0` configuration group:

```
[edit groups]
root@host# set re0 interfaces lo0 unit 0 family inet address address/prefix-length
```

7. Return to the top level of the hierarchy.

```
[edit groups re0]
root@host# top
```

The next steps repeat for `re1` the same steps as were done for the `re0` configuration group.

8. Create the configuration group `re1`.

```
[edit]
root@host# set groups re1
```

9. Navigate to the `groups re1` level of the configuration hierarchy.

```
[edit]
root@host# edit groups re1
```

10. Specify the device hostname.

```
[edit groups re1]
root@host# set system host-name host-name
```

NOTE: Before you begin the next step, see Supported Routing Engines by Router to find the management Ethernet interface that you should use to perform this configuration.

11. Configure the IP address and prefix length for the device management Ethernet interface.

- For devices that use the management Ethernet interface fxp0:

```
[edit groups]
root@host# set interfaces fxp0 unit 0 family inet address address/prefix-length
```

- For devices that use the management Ethernet interface em0:

```
[edit groups]
root@host# set interfaces em0 unit 0 family inet address address/prefix-length
```

12. Set the loopback interface address for `re1` configuration group:

```
[edit groups]
root@host# set re1 interfaces lo0 unit 0 family inet address address/prefix-length
```

13. Once both configuration groups have been set up, return to the top level of the hierarchy.

```
[edit groups re0]
root@host# top
```

14. Use the `apply-groups` statement to apply the configuration to the device.

```
[edit]
root@host# set apply-groups [ re0 re1 ]
```

15. Configure Routing Engine redundancy:

```
[edit]
root@host# set chassis redundancy routing-engine 0 master
root@host# set chassis redundancy routing-engine 1 backup
```

16. Save the configuration change on both Routing Engines:

```
[edit]
user@host> commit synchronize
```

After the configuration changes are saved, complete the management console configuration.

1. Set the root password by choosing one of the following:

- To enter a clear-text password, use the following command:

```
[edit]
root@host# set system root-authentication plain-text-password
```

```
New password: type password
Retype new password: retype password
```

- To enter a password that is already encrypted, use the following command:

```
[edit]
root@host# set system root-authentication encrypted-password encrypted-password
```

- To enter an SSH public key, use the following command:

```
[edit]
root@host# set system root-authentication ssh-rsa key
```

2. Configure the IP address of the DNS server.

```
[edit ]
root@host# set system name-server address
```

3. Configure the router domain name:

```
[edit ]
root@host# set system domain-name domain-name
```

4. Configure the IP address of a backup or default network device. A backup device is used only while the routing protocol process is not running. Choose a backup device that is directly connected to the local device by way of the management interface. The device uses this backup only when it is booting and or when the Junos routing software (the routing protocol process, rpd) is not running. For more information, see *Configuring a Backup Router*.

   For devices with two Routing Engines, the backup Routing Engine, `RE1`, uses the backup as a default gateway after the device boots. This enables you to access the backup Routing Engine. (`RE0` is the default primary Routing Engine.)

   NOTE: The backup router Routing Engine does not support more than 16 backup destinations. If you configure more than 16 destinations on the backup Routing Engine, the

Junos OS ignores any destination addresses after the sixteenth address and displays a commit-time warning message to this effect.

```
[edit]
root@host# set system backup-router address
```

5. Optionally, display the configuration statements:

```
[edit]
root@ show
system {
    host-name hostname;
    domain-name domain.name;
    backup-router address;
    root-authentication {
        (encrypted-password "password" | public-key);
        ssh-dsa "public-key";
        ssh-ecdsa "public-key";
        ssh-rsa "public-key";
    }
    name-server {
        address;
    }
    interfaces {
        fxp0 {
            unit 0 {
                family inet {
                    address address ;
                }
            }
        }
    }
}
```

On devices that use management Ethernet interface em0, you will see em0 in place of fxp0 in the `show` command output.

6. After you are satisfied that the configuration is successfully running, issue the `request system snapshot` command to back up the new configuration on both primary and backup Routing Engines.

```
{master}
user@host> request system snapshot
```

The root file system is backed up to **/altroot**, and **/config** is backed up to **/altconfig**. The root and **/config** file systems are on the device's CompactFlash card, and the **/altroot** and **/altconfig** file systems are on the device's hard drive.

NOTE: After you issue the `request system snapshot` command, you cannot return to the previous configuration, because the running copy and backup copy are identical.

For information about creating configuration groups, see Junos OS CLI User Guide.

For information about configuring high availability features for redundant Routing Engine systems and the `re0` group, see Junos OS High Availability User Guide.

RELATED DOCUMENTATION

- Configuring Automatic Mirroring of the CompactFlash Card on the Hard Drive | 69
- Configuring Junos OS for the First Time on a Device with a Single Routing Engine | 54
- Default Directories for Junos OS File Storage on the Network Device | 22
- Format for Specifying IP Addresses, Network Masks, and Prefixes in Junos OS Configuration Statements | 66
- Initial Router or Switch Configuration Using Junos OS | 53
- Supported Routing Engines by Router

How to Improve Commit Time When Using Configuration Groups

You use configuration groups to apply configurations across other hierarchies without re-entering configuration data. You can specify every configuration detail in a configuration groups. You can also use wildcards in configuration groups to configure ranges of data, without detailing each configuration line. Another way to use configuration groups is to create an inheritance path that includes a long string of configurations to be applied.

When a configuration that uses configuration groups is committed, the commit process expands and reads all the configuration data of the group into memory to apply the configurations as intended. The commit performance can be negatively affected if many configuration groups are being applied, especially if the configuration groups use wildcards extensively.

If your system uses many configuration groups that use wildcards, you can configure the `persist-groups-inheritance` statement at the `[edit system commit]` hierarchy level to improve commit time performance.

Using this option enables the system to build the inheritance path for each configuration group inside the database rather than in the process memory. This change can improve commit time performance. However, it can also increase the database size.

Creating and Activating a Candidate Configuration

You can enter software configuration statements using the CLI to create a candidate configuration that contains a hierarchy of statements. To have a candidate configuration take effect, you commit the changes. At this point, the candidate file is checked for proper syntax, activated, and marked as the current, operational software configuration file. If multiple users are editing the configuration, when you commit the candidate configuration, all changes made by all the users take effect.

The CLI always maintains a copy of previously committed versions of the software configuration. If you need to return to a previous configuration, you can do this from within the CLI.

RELATED DOCUMENTATION

Junos OS Commit Model for Configurations

Format for Specifying IP Addresses, Network Masks, and Prefixes in Junos OS Configuration Statements

Many statements in the Junos OS configuration include an option to specify an IP address or route prefix. This option is represented as *destination-prefix*/*prefix-length*. Specifically, the route prefix, followed by a slash and the destination prefix length. For example, 192.168.1.10/32.

You enter all IP addresses in classless mode. You can enter the IP address with or without a prefix length, in standard dotted notation (for example, 1.2.3.4), or hexadecimal notation as a 32-bit number in network-byte order (for example, 0x01020304). If you omit any octets, they are assumed to be zero. Specify the prefix length as a decimal number from 1 through 32.

RELATED DOCUMENTATION

Format for Specifying Filenames and URLs in Junos OS CLI Commands | 67

Format for Specifying Filenames and URLs in Junos OS CLI Commands

In some CLI commands and configuration statements—including `file copy`, `file archive`, `load`, `save`, `set system login user` *`username`* `authentication` *`load-key-file`*, and `request system software add`—you can include a filename. On a routing matrix, you can include chassis information (for example, `lcc0`, `lcc0-re0`, or `lcc0-re1`) as part of the filename.

You can specify a filename or URL in one of the following ways:

- *`filename`*—A file in the user's current directory on the local CompactFlash card (not applicable on the QFX Series). You can use wildcards to specify multiple source files or a single destination file. Wildcards are not supported in FTP.

  NOTE: Wildcards are supported only by the `file (compare | copy | delete | list | rename | show)` commands. When you issue the `file show` command with a wildcard, it must resolve to one filename.

- *`path/filename`*—A file on the local flash drive.

- *`filename`* or *`path/filename`*—File on the local hard drive. You can also specify a file on a local Routing Engine for a specific T640 router or a T1600 router in a routing matrix:

  ```
  user@host> file delete lcc0-re0:/var/tmp/junk
  ```

- `a:`*`filename`* or `a:`*`path/filename`*—A file on the local removable media. The default path is `/` (the root-level directory). The removable media can be in MS-DOS or UNIX (UFS) format.

- *`hostname`*`:/`*`path/filename`*, *`hostname`*`:`*`filename`*, *`hostname`*`:`*`path/filename`*, or "**scp://*hostname*/*path*/*filename***"—File on an **scp/ssh** server. This form is not available in the worldwide version of Junos OS. The default path is the user's home directory on the remote system. You can also specify ***hostname*** as ***username*@*hostname***.

- **ftp://*hostname*/*path*/*filename***—File on an FTP server. You can also specify ***hostname*** as ***username*@*hostname*** or ***username*:*password*@*hostname***. The default path is the user's home directory. To specify an absolute path, the path must start with **%2F**; for example, **ftp://*hostname*/%2F*path*/*filename***. To have the system prompt you for the password, specify **prompt** in

place of the password. If a password is required and you do not specify the password or **prompt**, an error message is displayed:

```
user@host> file copy ftp://username@ftp.hostname.net/filename
file copy ftp.hostname.net: Not logged in.
user@host> file copy ftp://username:prompt@ftp.hostname.net/filename
Password for username@ftp.hostname.net:
```

- **http://*hostname*/*path*/*filename***—A file on an HTTP server. You can also specify hostname as username@hostname or username:password@hostname. If a password is required and you omit it, you are prompted for it.

  NOTE: You cannot specify a HTTP(s) URL for a file as a destination, because HTTP(s) URLs are not writable. However you can specify HTTP(s) URL for a file as a source.

- **re0:/*path*/*filename*** or **re1:/*path*/*filename***—A file on a local Routing Engine. You can also specify a file on a local Routing Engine for a specific T640 router or a T1600 router in a routing matrix:

```
user@host> show log lcc0-re1:chassisd
```

RELATED DOCUMENTATION

Default Directories for Junos OS File Storage on the Network Device | 22

Format for Specifying IP Addresses, Network Masks, and Prefixes in Junos OS Configuration Statements | 66

Mapping the Name of the Router to IP Addresses

While using the Domain Name System (DNS) is an easier and more scalable way to resolve IP addresses from hostnames, you might want to manually map the hostname to a static IP address for the following reasons:

- You might not have a DNS entry for the device.
- You might not want the computer to contact the DNS server to resolve a particular IP address—you might use this particular IP address frequently, or it might be just for testing or development purposes.

To map a device's hostname to one or more IP addresses:

1. Include the `inet` statement at the `[edit system static-host-mapping hostname]` hierarchy level.

```
user@host# set system static-host-mapping hostname inet < ip-addresses >
```

2. Verify the configuration with the `show` command.

```
[edit system]
user@host# show
static-host-mapping {
    hostname {
        inet [ ip-addresses ];
    }
}
```

RELATED DOCUMENTATION

Configuring a Device's Unique Identity for the Network

Configuring a DNS Name Server for Resolving Hostnames into Addresses

Configuring Automatic Mirroring of the CompactFlash Card on the Hard Drive

You can direct the device hard drive to automatically mirror the contents of the CompactFlash card. When you include the `mirror-flash-on-disk` statement, the hard drive maintains a synchronized mirror copy of the CompactFlash card contents. Data written to the CompactFlash card is simultaneously updated in the mirrored copy of the hard drive. If the CompactFlash card fails to read data, the hard drive automatically retrieves its mirrored copy of the CompactFlash card.

NOTE: We recommend that you disable flash-to-disk mirroring when you upgrade or downgrade the router.

You cannot issue the `request system snapshot` command while flash-to-disk mirroring is enabled.

To configure the mirroring of the CompactFlash card to the hard drive, include the `mirror-flash-on-disk` statement at the `[edit system]` hierarchy level:

```
[edit system]
mirror-flash-on-disk;
```

NOTE: After you have enabled or disabled the `mirror-flash-on-disk` statement, you must reboot the device for your changes to take effect. To reboot, issue the `request system reboot` command.

NOTE: This feature is not supported in Junos OS Release 20.1.

RELATED DOCUMENTATION

Configuring Junos OS for the First Time on a Device with a Single Routing Engine | 54

Using Junos OS to Specify the Number of Configurations Stored on the CompactFlash Card | 70

Using Junos OS to Specify the Number of Configurations Stored on the CompactFlash Card

By default, Junos OS saves the current configuration and three previous versions of the committed configuration on the CompactFlash card, with an additional 46 older versions stored on the hard drive. The currently operational Junos OS configuration is stored in the file **juniper.conf.gz**, and the last three committed configurations are stored in the files **juniper.conf.1.gz**, **juniper.conf.2.gz**, and **juniper.conf.3.gz**. These four files are located in the CompactFlash card in the directory **/config**.

In addition to saving the current configuration and the current operational version, you can also specify how many previous versions of the committed configurations you want stored on the CompactFlash card in the directory **/config**. The remaining previous versions of committed configurations (4 through 49) are stored in the directory **/var/db/config** on the hard disk. This is useful when you have very large configurations that might not fit on the CompactFlash card.

To specify how many previous versions of the committed configurations you want stored on the CompactFlash card, include the `max-configurations-on-flash` statement at the `[edit system]` hierarchy level:

```
[edit system]
max-configurations-on-flash number;
```

number is a value from 0 through 49.

RELATED DOCUMENTATION

Configuring Automatic Mirroring of the CompactFlash Card on the Hard Drive | 69

Back Up Configurations to an Archive Site

IN THIS SECTION

- Configure the Transfer of the Active Configuration | 71

You can configure a device to transfer its configuration to an archive file periodically.

Configure the Transfer of the Active Configuration

If you want to back up your device's current configuration to an archive site, you can configure the device to transfer its active configuration by FTP, HTTP, or secure copy (SCP) periodically or after each commit.

To configure the device to transfer its active configuration to an archive site, include statements at the `[edit system archival configuration]` hierarchy level:

```
[edit system archival configuration]
archive-sites {
    ftp://username@host<:port>/url-path;
    http://username@host<:port>/url-path;
    scp://username@host<:port>/url-path;
}
routing-instance routing-instance;
```

```
transfer-interval interval;
transfer-on-commit;
```

To configure the device to periodically transfer its active configuration to an archive site, include the `transfer-interval` statement at the `[edit system archival configuration]` hierarchy level:

```
[edit system archival configuration]
transfer-interval interval;
```

The *interval* is a period of time ranging from 15 through 2880 minutes.

To configure the device to transfer the configuration to an archive site each time you commit the configuration, include the `transfer-on-commit` statement at the `[edit system archival configuration]` hierarchy level:

```
[edit system archival configuration]
transfer-on-commit;
```

When you configure the device to transfer its configuration files, you specify an archive site to which the files are transferred. If you specify more than one archive site, the device attempts to transfer files to the first archive site in the list, moving to the next site only if the transfer fails.

When you use the `archive-sites` statement, you can specify a destination as an FTP URL, HTTP URL, or SCP-style remote file specification. The URL type **file://** is also supported. When you specify the archive site, do not add a forward slash (/) to the end of the URL.

To configure the archive site, include the `archive-sites` statement at the `[edit system archival configuration]` hierarchy level:

```
[edit system archival configuration]
archive-sites {
    file://<path>/<filename>;
    ftp://username@host<:port>/url-path password password;
    http://username@host<:port>/url-path password password;
    scp://username@host<:port>/url-path password password;
}
```

NOTE: When specifying a URL in a statement using an IPv6 host address, you must enclose the entire URL in quotation marks ("") and enclose the IPv6 host address in brackets ([ ]). For example, "**ftp://** ***username*****<:*** ***password*****>@[*** ***ipv6-host-address*****]<:*** ***port*****>/** ***url-path***"

If the network device reaches the archive server through a specific routing instance, configure the `routing-instance` statement at the `[edit system archival configuration]` hierarchy level, and specify the routing instance.

```
[edit system archival configuration]
    routing-instance routing-instance;
```

The destination filename is saved in the following format, where *n* corresponds to the number of the compressed configuration rollback file that has been archived:

```
<router-name>_YYYYMMDD_HHMMSS_juniper.conf.n.gz
```

NOTE: The time included in the destination filename is in Coordinated Universal Time (UTC).

Configuring Junos OS to Set Console and Auxiliary Port Properties

Most Juniper Networks devices have a console port and an auxiliary port for connecting terminals to the router or switch. The console port is enabled by default, and its speed is 9600 baud. The auxiliary port is disabled by default.

To configure the properties for the console and auxiliary ports, include the `ports` statement at the `[edit system]` hierarchy level:

```
[edit system]
ports {
    auxiliary {
        disable;
        insecure;
        type terminal-type;
    }
```

```
    console {
        authentication-order;
        disable;
        insecure;
        log-out-on-disconnect;
        type terminal-type;
    }
}
```

By default, the terminal type is set to `unknown`. To change the terminal type, include the `type` statement, specifying a *terminal-type* of `ansi`, `vt100`, `small-xterm`, or `xterm`. The first three terminal types set a screen size of 80 columns by 24 lines. The last type, `xterm`, sets the size to 80 columns by 65 rows.

By default, the console session is not logged out when the data carrier is lost on the console modem control lines. To change this default and log out the session automatically when the data carrier on the console port is lost, include the `log-out-on-disconnect` statement. You can use the `show system users` command to verify the console session is logged out.

By default, terminal connections to the console and auxiliary ports are secure. When you configure the console as insecure, root logins are not allowed to establish terminal connections. In addition, superusers and anyone with a user identifier (UID) of 0 are not allowed to establish terminal connections in multiuser mode when you configure the console as insecure. To disable root login connections to the console and auxiliary ports, include the `insecure` statement. This option can be used to prevent someone from attempting password recovery by booting into single-user mode, if they do not know the root password.

To disable console login, include the `disable` statement. By default, console login is enabled.

NOTE: For Common Criteria compliance, the console port must be disabled.

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Methods for Configuring Junos OS | 45

CHAPTER 5

Monitoring Junos Devices

IN THIS CHAPTER

- Junos OS Tools for Monitoring | 75
- Tracing and Logging Junos OS Operations | 76
- Understanding Dropped Packets and Untransmitted Traffic Using show Commands | 78
- Log a User Out of the Device | 82

Junos OS Tools for Monitoring

The primary method of monitoring and troubleshooting Junos OS, routing protocols, network connectivity, and the device hardware is to enter commands from the CLI. The CLI enables you to display information in the routing tables and routing protocol-specific data, and to check network connectivity using `ping` and `traceroute` commands.

The J-Web GUI is a Web-based alternative to using CLI commands to monitor, troubleshoot, and manage the device.

Junos OS includes SNMP software, which enables you to manage routers. The SNMP software consists of an SNMP master agent and a MIB II agent, and supports MIB II SNMP version 1 traps and version 2 notifications, SNMP version 1 `Get` and `GetNext` requests, and version 2 `GetBulk` requests.

The software also supports tracing and logging operations so that you can track events that occur—both normal device operations and error conditions—and track the packets that are generated by or pass through the device. Logging operations use a syslog-like mechanism to record system-wide, high-level operations, such as interfaces going up or down and users logging in to or out of the device. Tracing operations record more detailed messages about the operation of routing protocols, such as the various types of routing protocol packets sent and received, and routing policy actions.

RELATED DOCUMENTATION

Junos OS Features for Device Security | 38

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Tracing and Logging Junos OS Operations

Tracing and logging operations allow you to track events that occur in the device—both normal operations and error conditions—and to track the packets that are generated by or passed through the device. The results of tracing and logging operations are placed in files in the **/var/log** directory.

Remote Tracing

Junos OS provides an option to do remote tracing for specific processes, which greatly reduces use of device internal storage for tracing and is analogous to remote system logging. You configure remote tracing system-wide using the `tracing` statement at the `[edit system]` hierarchy level. By default, remote tracing is not configured. You can disable remote tracing for specific processes using the `no-remote-trace` statement at the `[edit` *`process-name`* `traceoptions]` hierarchy level. This feature does not alter local tracing functionality in any way, and logging files are stored on the device.

Junos OS supports remote tracing for the following processes:

- chassisd—Chassis-control process
- eventd—Event-processing process
- cosd—Class-of-service process
- spd—Adaptive-services process

To enable system-wide remote tracing, include the `destination-override syslog host` statement at the `[edit system tracing]` hierarchy level. This specifies the remote host running the system log process (syslogd), which collects the traces. Traces are written to file(s) on the remote host per the syslogd configuration in **/etc/syslog.conf**. By default remote tracing is *not* configured.

To override the system-wide remote tracing configuration for a particular process, include the `no-remote-trace` statement at the `[edit` *`process-name`* `traceoptions]` hierarchy. When `no-remote-trace` is enabled, the process does local tracing.

NOTE: When remote tracing is configured, traces will go to the remote host.

To collect traces, use the `local0` facility as the selector in **/etc/syslog.conf** on the remote host. To separate traces from various processes into different files, include the process name or trace-file name if it is specified at the [edit *process-name* traceoptions file] hierarchy level, in the Program field in **/etc/syslog.conf**. If your syslog server supports parsing hostname and program name, then you can separate traces from the various processes.

Logging Operations

Logging operations use a system logging mechanism similar to the UNIX syslogd utility to record system-wide, high-level operations, such as interfaces going up or down and users logging in to or out of the device. You configure these operations by using the `syslog` statement at the `[edit system]` hierarchy level, as described in *Junos OS System Log Overview*, and by using the `options` statement at the `[edit routing-options]` hierarchy level, as described in the Junos OS Routing Protocols Library for Routing Devices.

Tracing Operations

Tracing operations record more detailed messages about the operation of routing protocols, such as the various types of routing protocol packets sent and received, and routing policy actions. You configure tracing operations using the `traceoptions` statement. You can define tracing operations in different portions of the router configuration:

- Global tracing operations: Define tracing for all routing protocols. You define these tracing operations at the `[edit routing-options]` hierarchy level of the configuration.
- Protocol-specific tracing operations: Define tracing for a specific routing protocol. You define these tracing operations in the `[edit protocols]` hierarchy when configuring the individual routing protocol. Protocol-specific tracing operations override any equivalent operations that you specify in the global `traceoptions` statement. If there are no equivalent operations, they supplement the global tracing options. If you do not specify any protocol-specific tracing, the routing protocol inherits all the global tracing operations.
- Tracing operations within individual routing protocol entities: Some protocols allow you to define more granular tracing operations. For example, in Border Gateway Protocol (BGP), you can configure peer-specific tracing operations. These operations override any equivalent BGP-wide operations or, if there are no equivalents, supplement them. If you do not specify any peer-specific tracing operations, the peers inherit, first, all the BGP-wide tracing operations and, second, the global tracing operations.
- Interface tracing operations: Define tracing for individual router interfaces and for the interface process itself. You define these tracing operations at the `[edit interfaces]` hierarchy level of the configuration as described in the Junos OS Network Interfaces Library for Routing Devices.

RELATED DOCUMENTATION

Junos OS Network Interfaces Library for Routing Devices

Junos OS Routing Protocols Library for Routing Devices

Junos OS System Log Overview

Understanding Dropped Packets and Untransmitted Traffic Using show Commands

Starting with Junos OS Release 14.2, packets that need to be forwarded to the adjacent network element or a neighboring device along a routing path might be dropped by a device owing to several factors. Some of the causes for such a loss of traffic or a block in transmission of data packets include overloaded system conditions, profiles and policies that restrict the bandwidth or priority of traffic, network outages, or disruption with physical cable faults. You can use a number of show commands to determine and analyze the statistical counters and metrics related to any traffic loss and take an appropriate corrective measure. The fields displayed in the output of the show commands help in diagnosing and debugging network performance and traffic-handling efficiency problems.

The following `show` commands and associated fields applicable for dropped packets enable you to view and analyze some of the system parameters for errors or disruption in transmitted packets.

`show interfaces extensive`—Display input and output packet errors or drops. Following are some of the `show interfaces extensive` input counters and their definitions.

Following are definitions for some of the output counters for `show interfaces extensive`:

Following are definitions for some of the Queue counters for `show interfaces extensive` (both outbound and inbound). This includes CoS queue number and its associated user-configured forwarding class name, and is displayed on IQ2 interfaces.

Errors — Sum of the incoming frame terminates and FCS errors.

Drops — Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism.

Framing errors — Number of packets received with an invalid frame checksum (FCS).

Runts — Number of frames received that are smaller than the runt threshold.

Policed discards — Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that the Junos OS does not handle.

L3 incompletes — Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. L3 incomplete errors can be ignored by configuring the `ignore-l3-incompletes` statement.

L2 channel errors	Number of times the software did not find a valid logical interface for an incoming frame.
L2 mismatch timeouts	Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable.
FIFO errors	Number of FIFO errors in the receive direction that are reported by the ASIC on the PIC. If this value is ever nonzero, the PIC is probably malfunctioning.
Resource errors	Error counter specific to the platform. For example on MX series routers, resource errors count PFE oversubscription drops.
Carrier transitions	Number of times the interface has gone from down to up. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and then up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), the cable, the far-end system, or the PIC or PIM is malfunctioning.
Errors	Sum of the outgoing frame terminates and FCS errors.
Drops	Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism.
Collisions	Number of Ethernet collisions. The Gigabit Ethernet PIC supports only full-duplex operation, so for Gigabit Ethernet PICs, this number should always remain 0. If it is nonzero, there is a software bug.
Aged packets	Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware.
FIFO errors	Number of FIFO errors in the send direction as reported by the ASIC on the PIC. If this value is ever nonzero, the PIC is probably malfunctioning.
HS link CRC errors	Number of errors on the high-speed links between the ASICs responsible for handling the router interfaces.
MTU errors	Number of packets whose size exceeded the MTU of the interface.
Resource errors	Error counter specific to the platform.
Queued packets	Number of queued packets.

Transmitted packets	Number of transmitted packets.
Dropped packets	Number of packets dropped by the ASIC's RED mechanism.

`show interfaces queue`—Display class-of-service (CoS) queue information for physical interfaces. Following are some of the `show interfaces queue` output fields and their definitions.

Queued packets	Number of queued packets.
Transmitted packets	Number of transmitted packets.
Dropped packets	Number of packets dropped by the ASIC's RED mechanism.
Tail-dropped packets	Number of packets dropped because of tail drop.
RL-dropped packets	Number of packets dropped due to rate limiting. For rate-limited interfaces hosted on MICs, MPCs, and Enhanced Queuing DPCs only, this statistic is not included in the queued traffic statistics.
RED-dropped packets	Number of packets dropped because of random early detection (RED). On M320 and M120 routers and most T Series routers, just the total number of dropped packets is displayed. For other M Series routers, as well as MX Series routers with enhanced DPCs, T Series routers with enhanced FPCs, and all J Series routers, the output classifies dropped packets into the following catetories: • `Low, non-TCP`—Number of low-loss priority non-TCP bytes dropped because of RED. • `Low, TCP`—Number of low-loss priority TCP packets dropped because of RED. • `High, non-TCP`—Number of high-loss priority non-TCP packets dropped because of RED. • `High, TCP`—Number of high-loss priority TCP packets dropped because of RED.

`show class-of-service fabric statistics summary`—Display class-of-service (CoS) switch fabric queue drop statistics. Following are the fabric queue statistics for dropped traffic:

Packets	Dropped packet count for high-priority and low-priority queues.
Bytes	Dropped byte count for high-priority and low-priority queues.
pps	Dropped packets-per-second count for high-priority and low-priority queues.

bps Dropped bits-per-second count for high-priority and low-priority queues.

`show pfe statistics traffic fpc`—Display packet drops related to the entire FPC. Following are the FPC-level statistics for Packet Forwarding Engine hardware discards:

The following statistics are related to Packet Forwarding Engine local traffic for `show pfe statistics traffic fpc`:

Timeout Number of packets discarded because of timeouts.

Truncated key Number of packets discarded because of truncated keys.

Bits to test Number of bits to test.

Data error Number of packets discarded because of data errors.

Stack underflow Number of packets discarded because of stack underflows.

Normal discard Number of packets discarded because of discard routes. Packets are dropped silently without being further processed by the host. Normal discards are reported when packets match a firewall filter term that has an action of discard or when the final result of the route look-up is a next hop of discard.

Extended discard Number of packets discarded because of illegal next hops. Packets are dropped silently but are also sent to the Routing Engine for further processing. Extended discards are reported when packets match a firewall filter term that has an action of discard and an additional action that requires Routing Engine processing, such as log, count, sample, or syslog.

Invalid interface Number of packets discarded because of invalid incoming interfaces.

Info cell drops Number of information cell drops.

Fabric drops Number of fabric drops.

Local packets input Number of incoming packets from the local network.

Local packets output Number of outgoing packets dispatched to a host in the local network.

Software input high drops Number of incoming software packets of high-priority, dropped during transmission.

Software input medium drops Number of incoming software packets of medium-priority, dropped during transmission.

Software input low drops	Number of incoming software packets of low-priority, dropped during transmission.
Software output drops	Number of outgoing software packets that were dropped during transmission.
Hardware input drops	Number of incoming hardware packets that were dropped during transmission.

The preceding commands represent only the main parameters that you can use to identify and monitor traffic drops or errors. Depending on your specific deployment scenario and network conditions, you might need to view the output of other relevant `show` commands to evaluate different factors that might be resulting in traffic transmission losses.

Log a User Out of the Device

Sometimes you may need to disconnect a user session if it does not terminate after a user logs out, or you may otherwise want to log a user out for some other reason.

To log a user out of all terminal sessions on a router, enter the following Junos OS CLI command:

```
user@host> request system logout username
```

```
user@host> show system users
10:07PM  up 13 days,  1:25, 2 users, load averages: 0.17, 0.05, 0.02
USER     TTY      FROM                              LOGIN@  IDLE WHAT
harry    p0       hpot-lt.cmpy.net                 10:07PM     - -cli (cl
lisa   p1       hpot-lt.cmpy.net                10:06PM     - -cli (cl

user@host>  request system logout user harry
user@host>  show system users

10:07PM  up 13 days,  1:25, 1 user, load averages: 0.24, 0.06, 0.02
USER     TTY      FROM                              LOGIN@  IDLE WHAT
lisa   p1       hpot-lt.cmpy.net                10:06PM     - -cli (cl
```

The sample output for the first `show system users` command shows there were two users on the router, harry and lisa. The `request system logout user` command was issued to log out user harry. Because there is no output to indicate that harry was logged out, the `show system users` command was issued again to verify that user harry was actually logged out of the router, while the user lisa remains logged in.

CHAPTER 6

Managing Junos OS Processes

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- Viewing Core Files from Junos OS Processes | 84
- Disabling Junos OS Processes | 85
- Configuring Failover to Backup Media If a Junos OS Process Fails | 85
- Using Virtual Memory for Process Configuration Data | 86

Saving Core Files from Junos OS Processes

By default, when an internal Junos OS process generates a core file, the file and associated context information are saved for debugging purposes in a compressed tar file named ***process-name*.core.*core-number*.tgz** in the **/var/tmp/** and **/var/crash/** directories. For Junos OS Evolved, the output is saved in the **/var/core/** directory for Routing Engine core files and **/var/lib/ftp/in/** for FPC core files. The contextual information includes the configuration and system log message files.

To disable the saving of core files and associated context information, include the `no-saved-core-context` statement at the `[edit system]` hierarchy level:

```
[edit system]
no-saved-core-context;
```

To save the core files only, include the `saved-core-files` statement at the `[edit system]` hierarchy level and specify the number of files to save:

```
[edit system]
saved-core-files number;
```

number is the number of core files to save and can be a value from 1 through 10.

To save the core files along with the contextual information, include the `saved-core-context` statement at the `[edit system]` hierarchy level:

```
[edit system]
saved-core-context;
```

RELATED DOCUMENTATION

- saved-core-context | 135
- saved-core-files | 137
- *Viewing Core Files from Junos OS Processes*

Viewing Core Files from Junos OS Processes

When an internal Junos OS process generates a core file, you can find the output at **/var/crash/** and **/var/tmp/**. For Junos OS Evolved, you can find the output core files at **/var/core/** for Routing Engine core files and **/var/lib/ftp/in/** for FPC core files. Using these directories provides a quick method of finding core issues across large networks.

Use the CLI command `show system core-dumps` to view core files.

```
root@host> show system core-dumps
-rw-------  1 root  wheel  268369920 Jun 18 17:59 /var/crash/vmcore.0
-rw-rw----  1 root  field    3371008 Jun 18 17:53 /var/tmp/rpd.core.0
-rw-r--r--  1 root  wheel   27775914 Jun 18 17:59 /var/crash/kernel.0
```

RELATED DOCUMENTATION

- Saving Core Files from Junos OS Processes

Disabling Junos OS Processes

CAUTION: Never disable any of the software processes unless instructed to do so by a Customer Support engineer.

To disable a software process, specify the appropriate option in the `processes` statement at the `[edit system]` hierarchy level:

```
[edit system]
processes {
    process-name (enable | disable);
}
```

NOTE: The *process-name* variable is one of the valid process names. You can obtain a complete list of process names by using the CLI command completion feature.

RELATED DOCUMENTATION

processes | 124

Configuring Failover to Backup Media If a Junos OS Process Fails | 85

Viewing Core Files from Junos OS Processes

Configuring Failover to Backup Media If a Junos OS Process Fails

For network devices with redundant Routing Engines, you can configure the device to switch to backup media that contains a version of the system if a software process fails repeatedly, or to the other Routing Engine.

To configure automatic switchover to backup media if a software process fails, include the `failover` statement at the `[edit system processes process-name]` hierarchy level. If this statement is configured for a

process, and that process fails four times within 30 seconds, the device reboots from either the alternative media or the other Routing Engine.:

```
[edit system processes]
process-name failover (alternate-media | other-routing-engine);
```

The value for *process-name* should be one of the valid process names.

RELATED DOCUMENTATION

Disabling Junos OS Processes | 85

Saving Core Files from Junos OS Processes | 83

Using Virtual Memory for Process Configuration Data

Configuration data for each process in Junos OS is stored in memory that is mapped within the address space of each process, requiring a fixed maximum space to be reserved in each process. This scheme works well until a process is managing many functions at commit time and negatively impacts the commit time, or simply needs more memory than the default allotment. For example, the `rpd` process might be managing many routes and require more space to store important information about the routes.

In circumstances that require more than the maximum memory-mapped size, you can use `virtual-memory-mapping` at the `[edit system configuration-database]` hierarchy level to make more memory available for the configuration database per process.

You can configure a portion of virtual memory at a fixed size for the initial portion of the configuration database, and you can specify an amount to be used for page-pooling. Page-pooling uses a small amount of memory to bring database pages into memory as needed, rather than mapping the entire configuration database into the virtual memory space for the process.

PART 3

Configuration Statements and Operational Commands

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CHAPTER 7

Configuration Statements

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backup-router

IN THIS SECTION

- Syntax | **89**
- Hierarchy Level | **89**
- Description | **90**
- Options | **90**
- Required Privilege Level | **90**
- Release Information | **90**

Syntax

```
backup-router address <destination destination-address>;
```

Hierarchy Level

```
[edit system]
```

Description

Set a default router (running IP version 4 [IPv4]) to use while the local router (running IPv4) is booting and if the routing protocol processes fail to start. The Junos OS removes the route to this router as soon as the software starts.

Options

address	Address of the default router.
destination *destination-address*	(Optional) Destination address that is reachable through the backup router. You can include this option to achieve network reachability while loading, configuring, and recovering the router, but without the risk of installing a default route in the forwarding table.

- **Default:** All hosts (default route) are reachable through the backup router.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

Release Information

Statement introduced before Junos OS Release 7.4.

RELATED DOCUMENTATION

Configuring a Backup Router

commit (System)

IN THIS SECTION

- Syntax | **91**
- Hierarchy Level | **91**

- Description | 91
- Options | 91
- Required Privilege Level | 92
- Release Information | 93

Syntax

```
commit {
    commit-synchronize-server;
    delta-export;
    fast-synchronize;
    notification;
    peers;
    peers-synchronize;
    persist-groups-inheritance | no-persist-groups-inheritance;
    server;
    synchronize;
}
```

The parameters for fast-synchronize and synchronize do not apply for the SRX Series.

Hierarchy Level

```
[edit system]
```

Description

Configure options for Junos OS commit.

Options

`commit-synchronize-server`—(Optional) Specify traceoptions for commit synchronize server actions.

`delta-export`—(Optional) Configure system commit to export only the changes made in the candidate configuration instead of exporting the entire candidate configuration to the configuration database. This helps to reduce the time taken to commit the configuration changes..

`fast-synchronize`—(Optional) Configure commits to run in parallel (simultaneously) on both the primary and backup Routing Engines to reduce the time required for commit synchronization. The fast-synchronize configuration is valid only on systems with two Routing Engines. (Option not available for SRX Series.)

`notification`—(Optional) Notify applications upon commit completion.

`peers`—(Optional) Specify the host names or IP addresses of the MC-LAG peers and the user authentication details for the users administering the MC-LAG peers that are participating in commit synchronization.

NOTE: Starting in Junos OS Release 17.1R1, the `peers` option at the [`edit system commit`] hierarchy level is not supported in batch configuration mode.

`peers-synchronize`—(Optional) Configure a commit synchronization on MC-LAG peers.

`persist-group-inheritance`—(Optional) Configure this option to improve commit performance for systems that use many configuration groups that use wildcards. This option causes the full inheritance paths of the configuration groups to be built in the database instead of in the process memory. To disable this option, use `no-persist-groups-inheritance`. Starting in Junos OS Evolved Release 19.2R1 and Junos OS Release 19.4R1, this option is enabled by default. Junos OS Evolved requires this feature to be enabled. The `no-persist-groups-inheritance` option to disable `persist-group-inheritance` is not supported in Junos OS Evolved.

`server`—(Optional) Configure a default batch commit.

`synchronize`—(Optional) For devices with multiple Routing Engines only. Configure the commit command to automatically perform a commit synchronize action between dual Routing Engines within the same chassis. The Routing Engine on which you execute the commit command (the requesting Routing Engine) copies and loads its candidate configuration to the other (the responding) Routing Engine. Each Routing Engine then performs a syntax check on the candidate configuration file being committed. If no errors are found, the configuration is activated and becomes the current operational configuration on both Routing Engines. (Option not available for SRX Series.)

The remaining statements are explained separately. See CLI Explorer.

Required Privilege Level

maintenance—To view this statement in the configuration.
maintenance-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 7.4.

Option `persist-groups-inheritance` added in Junos OS Release 13.2.

Option `delta-export` added in Junos OS Release 14.2.

Option `peers` added in Junos OS Release 14.2R6.

Option `peers-synchronize` added in Junos OS Release 14.2R6.

Option `no-persist-groups-inheritance` added in Junos OS Evolved Release 19.2R1 and Junos OS Release 19.4R1.

RELATED DOCUMENTATION

- *Improving Commit Time When Using Configuration Groups*
- *server*
- *synchronize*

compress-configuration-files (System)

IN THIS SECTION

- Syntax | **94**
- Hierarchy Level | **94**
- Description | **94**
- Default | **94**
- Options | **94**
- Required Privilege Level | **94**
- Release Information | **95**

Syntax

```
(compress-configuration-files | no-compress-configuration-files);
```

Hierarchy Level

```
[edit system]
```

Description

Compress the current operational configuration file. By default, the current operational configuration file is compressed, and is stored in the file **juniper.conf**, in the **/config** file system, along with the last three committed versions of the configuration. However, with large networks, the current configuration file might exceed the available space in the **/config** file system. Compressing the current configuration file allows the file to fit in the file system, typically reducing the size of the file by 90 percent. The current configuration file is compressed on the second commit of the configuration after the first commit is made to include the `compress-configuration-files` statement.

NOTE: We recommend that you enable compression of the router configuration files to minimize the amount of disk space that they require.

Default

The current operational configuration file is compressed.

Options

This command has no options.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

Release Information

Statement introduced before Junos OS Release 7.4.

RELATED DOCUMENTATION

Compressing the Current Configuration File

configuration-database

IN THIS SECTION

- Syntax | 95
- Hierarchy Level | 96
- Description | 96
- Options | 96
- Required Privilege Level | 97
- Release Information | 98

Syntax

```
configuration-database {
    ephemeral {
        allow-commit-synchronize-with-gres;
        commit-synchronize-model (asynchronous | synchronous);
        delete-ephemeral-default;
        ignore-ephemeral-default;
        instance instance-name;
    }
    extend-size;
    max-db-size max-db-size;
    resize {
        database-size-diff size MB;
        database-size-on-disk size MB;
```

```
    }
    virtual-memory-mapping {
        process process name {
            fixed-size size KB;
            page-pooling-size size KB;
        }
    }
}
```

Hierarchy Level

```
[edit system]
```

Description

Define parameters for the configuration databases.

Configure the `virtual-memory-mapping` statement hierarchy to increase the memory space available for the configuration database size per process, as needed, by using virtual memory mapping and page-pooling.

Configure the `ephemeral` statement hierarchy to specify options for the ephemeral configuration database.

Configure the `resize` statement hierarchy when it is necessary to resize the configuration database.

Options

ephemeral Configure settings for the ephemeral configuration database. `commit-synchronize-model` specifies the commit model used to synchronize ephemeral data to the backup Routing Engine during a commit synchronize operation; `instance` sets the instance name; `allow-commit-synchronize-with-gres` enables a device to synchronize ephemeral configuration data to the other Routing Engine when GRES is enabled on the device and a commit synchronize operation is requested; and `ignore-ephemeral-default` disables the default instance of the ephemeral configuration database.

extend-size Increase the memory space available for the configuration database, per process, up to 1.5 GB. The extended default size is based on the original default database size. A device with a default database size of 409.99 MB will extend to a maximum of 1049.99 MB, and a device with a default database size of 665.99 MB will extend to a maximum of 1305.99.

The `extend-size` and `max-db-size` statements are mutually exclusive and cannot be configured together.

You must reboot the router after committing this statement to make the change effective.

Any operation on the `system configuration-database extend-size` configuration statement such as, `deactivate`, `delete`, or `set`, generates the following warning message:

```
Change in 'system configuration-database extend-size' will be effective at next reboot only.
```

> **NOTE**: The `extend-size` configuration statement is supported for Junos OS Evolved starting in release 22.1.
>
> You should remove the `extend-size` statement before performing a rollback from Junos OS Evolved release 22.1 or later to any release prior to 22.1.

max-db-size Configures the maximum database size. `max-db-size` and `extend-size` are mutually exclusive and cannot be configured together.

resize Resizes the configuration database. The database will be resized automatically during the commit based on the values specified in the `database-size-diff` and `database-size-on-disk` attributes. The system will display `Database resize completed` when the configuration database has been successfully resized.

virtual-memory-mapping Define parameters for using virtual memory mapping for the configuration database on a per-process basis. You can define a fixed size for the initial portion of the database and configure a page-pooling size for the remaining portion of the database. The parameter `process` sets the process name, while `fixed-size` sets the size in kilobytes to directly map for the initial portion of the configuration database for the specified process and `page-pooling-size` sets the size in kilobytes to use for page-pooling the remaining data in the database, with the valid range being from 512KB to 680MB for each.

> **NOTE**: Junos OS Evolved does not support the virtual-memory-mapping option.

The remaining statements are explained separately. See CLI Explorer.

Required Privilege Level

admin—To view this statement in the configuration.

admin-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 13.2.

RELATED DOCUMENTATION

- Example: Configuring Virtual Memory for Process Configuration Data

domain-name

IN THIS SECTION

- Syntax | 98
- Hierarchy Level | 98
- Description | 98
- Options | 99
- Required Privilege Level | 99
- Release Information | 99

Syntax

```
domain-name domain-name;
```

Hierarchy Level

```
[edit system]
```

Description

Configure the name of the domain in which the router or switch is located. This is the default domain name that is appended to hostnames that are not fully qualified.

Options

domain-name Name of the domain.

> **NOTE**: The length of the domain name cannot exceed 255 characters.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

Release Information

Statement introduced before Junos OS Release 7.4.

domain-search

IN THIS SECTION

- Syntax | **99**
- Hierarchy Level | **100**
- Description | **100**
- Options | **100**
- Required Privilege Level | **100**
- Release Information | **100**

Syntax

```
domain-search [domain-list ];
```

Hierarchy Level

```
[edit system],
[edit system services dhcp],
[edit system services dhcp],
[edit system services dhcp pool],
[edit system services dhcp static-binding]
```

Description

Configure a list of domains to search (in the case where you want to configure access to multiple DNS servers for redundancy, and/or to resolve hosts that the previous server could not).

Options

domain-list List of domain servers to search. The list can contain up to six domain names, separated by a space, with a total of up to 256 characters.

For example to search `domain1.net`, and if it fails to resolve the host, `domain2.net`, and if fails to resolve the host, `domain3.net`, you would configure the following domain list at the `domain-search` hierarchy level:

```
[edit system]
set domain-search [domain1.net domain2.net domain3.net]
```

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

Release Information

Statement introduced before Junos OS Release 7.4.

fib-local

IN THIS SECTION

- Syntax | 101
- Hierarchy Level | 101
- Description | 101
- Required Privilege Level | 101
- Release Information | 102

Syntax

```
fib-local;
```

Hierarchy Level

```
[edit chassis fpc fpc-number route-localization]
```

Description

Configure the Packet Forwarding Engine on an FPC as FIB-local.

NOTE: At least, one Packet Forwarding Engine must be configured as **fib-local** for the commit operation to be successful. If you do not configure **fib-local** for the Packet Forwarding Engine, the CLI displays an appropriate error message and the commit fails.

Required Privilege Level

interface—To view this statement in the configuration.

interface-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 11.4.

RELATED DOCUMENTATION

Example: Configuring Packet Forwarding Engine FIB Localization | 30

fib-remote

IN THIS SECTION

- Syntax | 102
- Hierarchy Level | 102
- Description | 102
- Required Privilege Level | 103
- Release Information | 103

Syntax

```
fib-remote;
```

Hierarchy Level

```
[edit chassis fpc fpc-number route-localization]
```

Description

Configure the Packet Forwarding Engine on an FPC as FIB-remote.

Required Privilege Level

interface—To view this statement in the configuration.

interface-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 11.4.

RELATED DOCUMENTATION

Example: Configuring Packet Forwarding Engine FIB Localization | 30

filter

IN THIS SECTION

- Syntax | 103
- Hierarchy Level | 103
- Description | 104
- Required Privilege Level | 104
- Release Information | 104

Syntax

```
filter;
```

Hierarchy Level

```
[edit chassis memory-enhanced]
```

Description

Enables storing of firewall filters across multiple static RAM (SRAM) segments, resulting in proper utilization of SRAM segments. This feature is useful in routers with small routing tables and large firewall filters. This statement is supported on T Series routers.

Required Privilege Level

interface—To view this statement in the configuration.

interface-control—To add this statement to the configuration.

Release Information

Statement added in Junos OS Release 11.1.

RELATED DOCUMENTATION

Allocating More Memory for Routing Tables, Firewall Filters, and Layer 3 VPN Labels

host-name

IN THIS SECTION

- Syntax | **105**
- Hierarchy Level | **105**
- Description | **105**
- Options | **105**
- Required Privilege Level | **105**
- Release Information | **105**

Syntax

```
host-name hostname;
```

Hierarchy Level

```
[edit system]
```

Description

Set the hostname of the router or switch.

Options

hostname	Name of the router or switch.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

Release Information

Statement introduced before Junos OS Release 7.4.

inet6-backup-router

IN THIS SECTION

- Syntax | 106
- Hierarchy Level | 106
- Description | 106

- Options | 106
- Required Privilege Level | 106
- Release Information | 107

Syntax

```
inet6-backup-router address <destination destination-address>;
```

Hierarchy Level

```
[edit system]
```

Description

Set a default router (running IP version 6 [IPv6]) to use while the local router or switch (running IPv6) is booting and if the routing protocol processes fail to start. The Junos OS removes the route to this router or switch as soon as the software starts.

Options

address — Address of the default router.

destination *destination-address* — (Optional) Destination address that is reachable through the backup router. You can include this option to achieve network reachability while loading, configuring, and recovering the router or switch, but without the risk of installing a default route in the forwarding table.

- **Default:** All hosts (default route) are reachable through the backup router.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

Release Information

Statement introduced before Junos OS Release 7.4.

location (System)

IN THIS SECTION

- Syntax | **107**
- Hierarchy Level | **108**
- Description | **108**
- Options | **108**
- Required Privilege Level | **108**
- Release Information | **109**

Syntax

```
location {
    altitude feet;
    building name;
    country-code code;
    floor number;
    hcoord horizontal-coordinate;
    lata transport-area;
    latitude degrees;
    longitude degrees;
    npa-nxx number;
    postal-code postal-code;
    rack number;
    vcoord vertical-coordinate;
}
```

Hierarchy Level

```
[edit system]
```

Description

Configure the system location in various formats.

Options

altitude *feet*	Number of feet above sea level.
building *name*	Name of building. The name of the building can be 1 to 28 characters in length. If the string contains spaces, enclose it in quotation marks (" ").
country-code *code*	Two-letter country code.
floor *number*	Floor in the building.
hcoord *horizontal-coordinate*	Bellcore Horizontal Coordinate.
lata *transport-area*	Local Access Transport Area.
latitude *degrees*	Latitude in degree format.
longitude *degrees*	Longitude in degree format.
npa-nxx *number*	First six digits of the phone number (area code and exchange).
postal-code *postal-code*	Postal code.
rack *number*	Rack number.
vcoord *vertical-coordinate*	Bellcore Vertical Coordinate.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

Release Information

Statement introduced before Junos OS Release 7.4.

RELATED DOCUMENTATION

Specifying the Device Physical Location

memory-enhanced

IN THIS SECTION

- Syntax | 109
- Hierarchy Level | 109
- Description | 110
- Required Privilege Level | 110
- Release Information | 110

Syntax

```
memory-enhanced {
    filter;
    route;
    vpn-label;
}
```

Hierarchy Level

```
[edit chassis]
```

Description

Allocate more jtree memory for routing tables and Layer 3 VPNs.

> **NOTE**: The `memory-enhanced` statement supports MX Series routers with DPC (I-chip based) line cards only.

The remaining statements are explained separately.

Required Privilege Level

interface—To view this statement in the configuration.

interface-control—To add this statement to the configuration.

Release Information

Statement added in Junos OS Release 10.4.

RELATED DOCUMENTATION

- Allocating More Memory for Routing Tables, Firewall Filters, and Layer 3 VPN Labels

management-instance

IN THIS SECTION

- Syntax | **111**
- Hierarchy Level | **111**
- Description | **111**
- Options | **111**
- Required Privilege Level | **111**
- Release Information | **111**

Syntax

```
management-instance;
```

Hierarchy Level

```
[edit system]
```

Description

Enable a dedicated management virtual routing and forwarding (VRF) instance. The name of the dedicated management instance is reserved and hardcoded as `mgmt_junos`; you cannot configure any other routing instance by the name `mgmt_junos`.

The management Ethernet interface (usually named `fxp0` or `em0`) provides the out-of-band management network for the router. There is no clear separation between either out-of-band management traffic and in-band protocol control traffic, or user traffic at the routing-instance or routing table level. The `management-instance` configuration statement confines the management interface in the dedicated management instance `mgmt_junos`, and it enables an administrative routing table dedicated to management tasks for the network device.

For more information about configuring `management-instance` and the `mgmt_junos` routing instance, see *Management Interface in a Non-Default Instance*.

Options

This command has no options.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 17.3R1.

max-configurations-on-flash

IN THIS SECTION

- Syntax | 112
- Hierarchy Level | 112
- Description | 112
- Options | 112
- Required Privilege Level | 112
- Release Information | 113

Syntax

```
max-configurations-on-flash number;
```

Hierarchy Level

```
[edit system]
```

Description

Specify the number of configurations stored on the CompactFlash card.

Options

number The number of configurations stored on the CompactFlash card.

- **Range:** 0 through 49. The most recently saved configuration is number 0, and the oldest saved configuration is number 49.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

Release Information

Statement introduced before Junos OS Release 7.4.

RELATED DOCUMENTATION

Using Junos OS to Specify the Number of Configurations Stored on the CompactFlash Card | 70

mirror-flash-on-disk

IN THIS SECTION

- Syntax | 113
- Hierarchy Level | 113
- Description | 114
- Options | 114
- Required Privilege Level | 114
- Release Information | 114

Syntax

```
mirror-flash-on-disk;
```

Hierarchy Level

```
[edit system]
```

Description

Configure the hard disk to automatically mirror the contents of the CompactFlash card. The hard disk maintains a synchronized mirror copy of the CompactFlash card contents. Data written to the CompactFlash card is simultaneously updated in the mirrored copy of the hard disk. If the CompactFlash card fails to read data, the hard disk automatically retrieves its mirrored copy of the CompactFlash card.

CAUTION: We recommend that you disable flash disk mirroring when you upgrade or downgrade the router.

You cannot issue the `request system snapshot` command while the `mirror-flash-on-disk` statement is enabled.

NOTE: After you have enabled or disabled the `mirror-flash-on-disk` statement, you must reboot the router for your changes to take effect. To reboot, issue the `request system reboot` command.

Options

This command has no options.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

Release Information

Statement introduced before Junos OS Release 7.4.

Statement deprecated for Junos OS with Upgraded FreeBSD in Junos OS Release 15.1.

NOTE: To determine which platforms run Junos OS with Upgraded FreeBSD, see the table listing the platforms currently running Junos OS with upgraded FreeBSD in Release Information for Junos OS with Upgraded FreeBSD.

RELATED DOCUMENTATION

Configuring Automatic Mirroring of the CompactFlash Card on the Hard Drive | 69

name-server (System Services)

IN THIS SECTION

- Syntax | 115
- Hierarchy Level | 115
- Description | 116
- Options | 116
- Required Privilege Level | 116
- Release Information | 116

Syntax

```
name-server {
    address {
        routing-instance routing-instance;
    }
}
```

Hierarchy Level

```
[edit system],
[edit system services dhcp],
[edit system services dhcp],
[edit system services dhcp pool],
[edit system services dhcp static-binding]
```

Description

Configure one or more Domain Name System (DNS) name servers.

Options

address	Address of the name server. To configure multiple name servers, include a maximum of three *address* options.
routing-instance *routing-instance*	Configure name of the routing instance through which the name server is reachable. **NOTE**: The only routing instance supported is `mgmt_junos`. Also, this routing instance command is not supported on SRX Series devices.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

Release Information

Statement introduced before Junos OS Release 7.4.

`routing-instance` options introduced in Junos OS Release 19.2R1 under the `[edit system]` hierarchy level only.

RELATED DOCUMENTATION

Configuring a DNS Name Server for Resolving Hostnames into Addresses

non-subscriber-no-reply

IN THIS SECTION

- Syntax | 117
- Hierarchy Level | 117
- Description | 117
- Options | 117
- Required Privilege Level | 118
- Release Information | 118

Syntax

```
non-subscriber-no-reply;
```

Hierarchy Level

```
[edit system arp]
```

Description

Enable this option to drop ARP requests from non-subscribers when a user route is dynamically added for a subscriber. Configuring this statement suppresses the ARP response from the kernel when there is an ARP request for a loopback interface from static DHCP subscribers using a common LAN segment between two devices. However, this configuration might not be effective if the subscriber configuration has suppressed either a destination Layer 2 route or an access Layer 3 route.

Options

This command has no options.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 13.3R9.

RELATED DOCUMENTATION

autoinstallation

no-route-localize

IN THIS SECTION

- Syntax | 118
- Hierarchy Level | 118
- Description | 119
- Required Privilege Level | 119
- Release Information | 119

Syntax

```
no-route-localize;
```

Hierarchy Level

```
[edit policy-options policy-statement policy-name term term-name then]
```

Description

Enforce installation of routes on all FIB-remote Packet Forwarding Engines.

Required Privilege Level

routing—To view this statement in the configuration.

routing-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 11.4.

RELATED DOCUMENTATION

Example: Configuring Packet Forwarding Engine FIB Localization | 30

pic-console-authentication

IN THIS SECTION

- Syntax | 120
- Hierarchy Level | 120
- Description | 120
- Default | 120
- Options | 120
- Required Privilege Level | 120
- Release Information | 120

Syntax

```
pic-console authentication {
    (encrypted-password "password");
}
```

Hierarchy Level

```
[edit system]
```

Description

Configure console access to Physical Interface Cards (PICs).

Default

Disabled. By default, there is no password setting for console access.

Options

encrypted-password "*password*"

Use MD5 or other encrypted authentication. Specify the MD5 or other password. You can specify only one encrypted password.

You cannot configure a blank password for `encrypted-password` using blank quotation marks (" "). You must configure a password whose number of characters range from 1 through 128 characters and enclose the password in quotation marks.

Required Privilege Level

admin—To view this statement in the configuration.

admin-control—To add this statement to the configuration.

Release Information

Statement introduced before Junos OS Release 7.4.

RELATED DOCUMENTATION

Configuring Junos OS to Set Console and Auxiliary Port Properties | 73

Configuring Password Authentication for Console Access to PICs

port (Syslog)

IN THIS SECTION

- Syntax | 121
- Hierarchy Level | 121
- Description | 121
- Options | 121
- Required Privilege Level | 122
- Release Information | 122

Syntax

```
port port number;
```

Hierarchy Level

```
[edit system syslog host hostname | other-routing-engine| scc-master)]
```

Description

Specify the port number for the remote syslog server.

Options

port number	Port number of the remote syslog server.

- **Range:** 0 through 65535
- **Default:** 514

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 11.3.

RELATED DOCUMENTATION

syslog (System)

host (System)

ports

IN THIS SECTION

- Syntax | 122
- Hierarchy Level | 123
- Description | 123
- Options | 123
- Required Privilege Level | 123
- Release Information | 123

Syntax

```
ports {
    auxiliary {
```

```
        disable;
        insecure;
        type terminal-type;
        port-type  (mini-usb | rj45);
    }
    console {
        disable;
        insecure;
        log-out-on-disconnect;
        type terminal-type;
    }
}
```

Hierarchy Level

```
[edit system]
```

Description

Configure the properties of the console and auxiliary ports. The ports are located on the router's craft interface.

See the switch's hardware documentation for port locations.

Options

The remaining statements are explained separately. See CLI Explorer.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

Release Information

Statement introduced before Junos OS Release 7.4.

RELATED DOCUMENTATION

Configuring Junos OS to Set Console and Auxiliary Port Properties | 73

processes

IN THIS SECTION

- Syntax | 124
- Hierarchy Level | 124
- Description | 124
- Default | 125
- Options | 125
- Required Privilege Level | 125
- Release Information | 125

Syntax

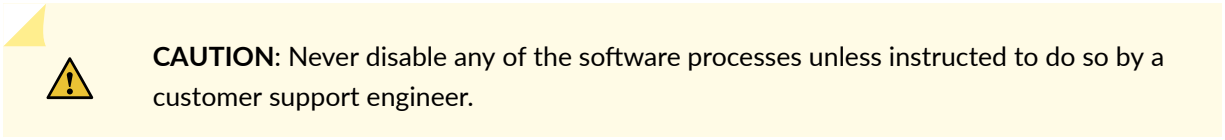
```
processes {
    process-name (enable | disable) failover (alternate-media | other-routing-engine);
    timeout seconds;
}
```

Hierarchy Level

```
[edit system]
```

Description

Configure which Junos OS processes are running on the router or switch.



Default

All processes are enabled by default.

Options

(enable | disable)	(Optional) Enable or disable a specified process.
failover (alternate-media | other-routing-engine)	(Optional) For routers or switches with redundant Routing Engines only, switch to backup media if a process fails repeatedly. If a process fails four times within 30 seconds, the router or switch reboots from the alternate media or the other Routing Engine.
process-name	One of the valid process names. You can obtain a complete list of process names by using the CLI command completion feature. After specifying a process name, command completion also indicates any additional options for that process.
timeout *seconds*	(Optional) How often the system checks the watchdog timer, in seconds. If the watchdog timer has not been checked in the specified number of seconds, the system reloads. If you set the time value too low, it is possible for the system to reboot immediately after it loads. • **Values:** 15, 60, or 180 • **Default:** 180 seconds (rounded up to 291 seconds by the Junos kernel)

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

Release Information

Statement introduced before Junos OS Release 7.4.

RELATED DOCUMENTATION

Disabling Junos OS Processes | 85

proxy (System)

IN THIS SECTION

- Syntax | 126
- Hierarchy Level | 126
- Description | 126
- Options | 127
- Required Privilege Level | 127
- Release Information | 127

Syntax

```
proxy {
    server (hostname | ip-address);
    port port-number;
    username username;
    password password;
}
```

Hierarchy Level

```
[edit system]
```

Description

Configure the proxy server properties for a device.

Options

server Configure the server by hostname or IP address.

port Set the port number for the proxy server ranging from 0 through 65535.

username Specify the user name configured in the proxy server.

password Specify the password associated with the `username` for the proxy server.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 11.4.

RELATED DOCUMENTATION

Example: Configuring a Proxy Server for License Updates

redundancy-interface-process

IN THIS SECTION

- Syntax | **128**
- Hierarchy Level | **128**
- Description | **128**
- Options | **128**
- Required Privilege Level | **128**
- Release Information | **129**

Syntax

```
redundancy-interface-process {
    command binary-file-path;
    disable;
    failover (alternate-media | other-routing-engine);
}
```

Hierarchy Level

```
[edit system processes]
```

Description

Specify as an active or backup process of an application server, configure to process traffic for more than one logical application server.

Options

command *binary-file-path*	Path to the binary process.
disable	Disable the redundancy interface management process.
failover	Configure the device to reboot if the software process fails four times within 30 seconds, and specify the software to use during the reboot.
alternate-media	Configure the device to switch to backup media that contains a version of the system if a software process fails repeatedly.
other-routing-engine	Instruct the secondary Routing Engine to take primary role if a software process fails. If this statement is configured for a process, and that process fails four times within 30 seconds, then the device reboots from the secondary Routing Engine.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 8.5.

root-authentication

IN THIS SECTION

- Syntax | 129
- Hierarchy Level | 130
- Description | 130
- Options | 130
- Required Privilege Level | 130
- Release Information | 130

Syntax

```
root-authentication {
    encrypted-password "password";
    no-public-keys
    ssh-ecdsa name {
        from from;
    }
    ssh-ed25519 name {
        from from;
    }
    ssh-rsa name {
        from from;
    }
}
```

Hierarchy Level

```
[edit system]
```

Description

Configure the authentication methods for the root-level user, whose username is `root`.

You can use the `ssh-ecdsa`, `ssh-ed25519`, or `ssh-rsa` statements to directly configure SSH ECDSA, ED25519, or RSA keys to authenticate root logins. You can configure more than one public key for SSH authentication of root logins as well as for user accounts. When a user logs in as root, the public keys are referenced to determine whether the private key matches any of them.

Options

encrypted-password "*password*"	Specify the MD5 or other password. You can specify only one encrypted password. You cannot configure a blank password using blank quotation marks (" "). You must configure a password whose number of characters range from 1 through 128 characters and enclose the password in quotation marks.
no-public-keys	Disable SSH public key-based authentication.
ssh-ecdsa *name* from *from*	Use an SSH ECDSA public key. You can specify one or more public keys.
ssh-ed25519 *name* from *from*	Use an SSH ED25519 public key. You can specify one or more public keys.
ssh-rsa *name* from *from*	Use an SSH RSA public key. You can specify one or more public keys.

Required Privilege Level

admin—To view this statement in the configuration.

admin-control—To add this statement to the configuration.

Release Information

Statement introduced before Junos OS Release 7.4.

RELATED DOCUMENTATION

class (Defining Login Classes)

user (Access)

route (chassis)

IN THIS SECTION

- Syntax | 131
- Hierarchy Level | 131
- Description | 131
- Required Privilege Level | 131
- Release Information | 132

Syntax

```
route;
```

Hierarchy Level

```
[edit chassis memory-enhanced]
```

Description

Allocate more jtree memory for routing tables over firewall filters.

Required Privilege Level

interface—To view this statement in the configuration.

interface-control—To add this statement to the configuration.

Release Information

Statement added in Junos OS Release 10.4.

RELATED DOCUMENTATION

Allocating More Memory for Routing Tables, Firewall Filters, and Layer 3 VPN Labels

route-localization

IN THIS SECTION

- Syntax | 132
- Hierarchy Level | 132
- Description | 132
- Options | 133
- Required Privilege Level | 133
- Release Information | 133

Syntax

```
route-localization {
    inet;
    inet6;
}
```

Hierarchy Level

[edit chassis]

Description

Configure FIB localization for IPv4 and IPv6 routes.

Options

inet Configure FIB localization for IPv4 routes.

inet6 Configure FIB localization for IPv6 routes.

Required Privilege Level

interface—To view this statement in the configuration.

interface-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 11.4.

RELATED DOCUMENTATION

Example: Configuring Packet Forwarding Engine FIB Localization | 30

routing (System Processes)

IN THIS SECTION

- Syntax | 134
- Hierarchy Level | 134
- Description | 134
- Default | 134
- Options | 134
- Required Privilege Level | 135
- Release Information | 135

Syntax

```
routing {
    force-32-bit | force-64-bit | auto-64-bit;
}
```

Hierarchy Level

```
[edit system processes],
[edit logical-systems logical-system name system processes]
```

Description

Configure routing protocols process (rpd) mode.

Default

`force-32-bit` mode is used in Junos 15.1F2 and prior releases

`auto-64-bit` mode is used starting in Junos 15.1F3

Options

auto-64-bit (Optional) Enable to use 64-bit mode. If the system is 64-bit capable and has at least 16 GB of RAM, then `auto-64-bit` will cause the Routing Engine to run in 64-bit mode. Otherwise, it will run in 32-bit mode.

> **NOTE**: This option is not applicable for logical systems.
> Starting in Junos 15.1F3, 15.1R2, 15.1R3, and 15.2R1, 64-bit mode is enabled by default on systems that support it and which have at least 16 GB of RAM.

force-32-bit (Optional) Enable to always use 32-bit mode.

> **NOTE**: For MX Series routers, virtual private LAN service (VPLS) dynamic profiles are not supported with the 64-bit mode routing protocol process (rpd). To enable VPLS dynamic profiles configuration, configure the routing process to use 32-bit mode.

`force-64-bit` (Optional) Enable to always use 64-bit mode.

> **TIP**: You need not restart the routing protocol process (rpd) to use the 64-bit mode. However, forcing rpd from 32-bit to 64-bit or 64-bit-to 32-bit will restart the rpd process, which can impact the routing protocols. For this reason, it is recommended to perform these changes in a maintenance window.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 13.3 R4.

RELATED DOCUMENTATION

Disabling Junos OS Processes | 85

processes | 124

saved-core-context

IN THIS SECTION

Syntax | 136

- Hierarchy Level | 136
- Description | 136
- Options | 136
- Required Privilege Level | 136
- Release Information | 137

Syntax

```
(saved-core-context | no-saved-core-context);
```

Hierarchy Level

```
[edit system]
```

Description

Configure whether the router saves core files generated by internal Junos processes, along with contextual information (system log files and a copy of the current configuration):

- `saved-core-context`—The router saves each cores file and its associated context in a compressed tar file named **/var/tmp/*process-name*.core.*core-number*.tgz**.
- `no-saved-core-context`—The router does not save cores files and their associated context.

Options

These commands have no options.

Required Privilege Level

admin—To view this statement in the configuration.

admin-control—To add this statement to the configuration.

Release Information

Statement introduced before Junos OS Release 7.4.

RELATED DOCUMENTATION

Saving Core Files from Junos OS Processes | 83

saved-core-files

IN THIS SECTION

- Syntax | 137
- Hierarchy Level | 137
- Description | 137
- Options | 138
- Required Privilege Level | 138
- Release Information | 138

Syntax

```
saved-core-files number;
```

Hierarchy Level

```
[edit system]
```

Description

Save core files generated by internal Junos processes, but not the associated contextual information (configuration and system log files).

Options

number Maximum number of core files to save. The valid range is from 1 through 10.

Required Privilege Level

admin—To view this statement in the configuration.

admin-control—To add this statement to the configuration.

Release Information

Statement introduced before Junos OS Release 7.4.

RELATED DOCUMENTATION

Saving Core Files from Junos OS Processes | 83

static-host-mapping

IN THIS SECTION

- Syntax | 139
- Hierarchy Level | 139
- Description | 139
- Default | 139
- Options | 139
- Required Privilege Level | 140
- Release Information | 140

Syntax

```
static-host-mapping {
    hostname {
        alias [ aliases ];
        inet [ addresses ];
        inet6 [ addresses];
        sysid system-identifier;
    }
}
```

Hierarchy Level

```
[edit system]
```

Description

(Optional) Statically map a hostname to one or more IP addresses and aliases, and configure an International Organization for Standardization (ISO) system identifier (system ID).

Default

If you do not statically map the hostname, the mapping is generated dynamically, based on the system configuration. For instance, if you omit the `static-host-mapping` *`hostname`* `sysid` statement, the IS-IS system ID is dynamically generated from the host portion of the ISO address configured on the loopback interface (lo0) and is mapped to the `host-name` statement configured at the `[edit system]` hierarchy level.

Options

alias ***alias***	Alias for the hostname.
hostname	Fully qualified hostname.
inet ***address***	IP address. You can specify one or more IP addresses for the host.
sysid ***system-identifier***	ISO system identifier (system ID). This is the 6-byte portion of the Intermediate System-to-Intermediate System (IS-IS) network service access point (NSAP). We recommend that you use the host's IP address represented in binary-coded decimal

(BCD) format. For example, the IP address 208.197.169.18 is 2081.9716.9018 in BCD.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

Release Information

Statement introduced before Junos OS Release 7.4.

vpn-label

IN THIS SECTION

- Syntax | **140**
- Hierarchy Level | **140**
- Description | **141**
- Required Privilege Level | **141**
- Release Information | **141**

Syntax

```
vpn-label;
```

Hierarchy Level

```
[edit chassis memory-enhanced]
```

Description

Allocate more jtree memory for Layer 3 VPN labels.

Required Privilege Level

interface—To view this statement in the configuration.

interface-control—To add this statement to the configuration.

Release Information

Statement added in Junos OS Release 10.4.

RELATED DOCUMENTATION

- Allocating More Memory for Routing Tables, Firewall Filters, and Layer 3 VPN Labels

CHAPTER 8

File Management Commands

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- file archive | 142
- file compare | 146
- file copy | 149
- file list | 153
- file rename | 156
- file show | 158

file archive

IN THIS SECTION

- Syntax | 142
- Description | 143
- Options | 143
- Required Privilege Level | 143
- Output Fields | 143
- Sample Output | 144
- Release Information | 145

Syntax

```
file archive destination destination source source
<compress>
```

```
<exclude> filepattern
<routing-instance>
<source-address>
```

Description

Archive, and optionally compress, one or multiple local system files as a single file, locally or at a remote location.

For information on valid filename and URL formats, see "Format for Specifying Filenames and URLs in Junos OS CLI Commands" on page 67.

Options

destination *destination*	Destination of the archived file or files. Specify the destination as a URL or filename. The Junos OS adds one of the following suffixes if the destination filename does not already have it: • For archived files—The suffix **.tar** • For archived and compressed files—The suffix **.tgz**
source *source*	Source of the original file or files. Specify the source as a URL or filename.
compress	(Optional) Compress the archived file with the GNU zip (gzip) compression utility. The compressed files have the suffix **.tgz**.
exclude	(Optional) Specify the file pattern to exclude. `exclude` helps to exclude files that delay compression or files that need not be compressed.
routing-instance *routing-instance-name*	(Optional) Name of the routing-instance.
source-address *address*	(Optional) Local address to use in originating the connection.

Required Privilege Level

maintenance

Output Fields

When you enter this command, you are provided feedback on the status of your request.

Sample Output

file archive (Multiple Files)

The following sample command archives all messages files in the local directory `/var/log/` as the single file `messages-archive.tar`.

```
user@host> file archive source /var/log/messages* destination /var/log/messages-archive.tar
/usr/bin/tar: Removing leading / from absolute path names in the archive.

user@host>
```

file archive (Single File)

The following sample command archives a single messages file in the local directory `/var/log/` as the single file `messages-archive.tar`.

```
user@host> file archive source /var/log/messages destination /var/log/messages-archive.tar
/usr/bin/tar: Removing leading / from absolute path names in the archive.

user@host>
```

file archive (with Compression)

The following sample command archives and compresses all messages files in the local directory `/var/log/` as the single file `messages-archive.tar`.

```
user@host> file archive compress source /var/log/messages* destination /var/log/messages-
archive.tgz
/usr/bin/tar: Removing leading / from absolute path names in the archive.
user@host>
```

File Archive Using Secure Copy Protocol (scp) with 'source-address' and 'routing-instance' options

To use the scp command to archive a file with the `source-address` and `routing-instance` options, enter the following command:

```
user@host> file archive source source destination scp:// destination source-address address
routing-instance instance-name
```

File Archive Compress (with Exclude Option)

The following sample command archives and compresses all messages files in the local directory `/var/log/` and excludes the single file pattern specified.

```
user@host>file archive compress source /var/log destination /var/tmp/sample exclude trace*
/bin/tar: Removing leading `/' from member names
/bin/tar: /var/log/journal/dbf38b9cae4d11ec862e4fb4fcef8787/system.journal: file changed as we
read it
```

Release Information

Command introduced before Junos OS Release 7.4.

`exclude` option added in Junos OS Release 20.3R1 and Junos OS Evolved Release 20.3R1.

`routing-instance` option added in Junos OS Release 18.4R1.

`source-address` option added in Junos OS Release 18.4R1.

RELATED DOCUMENTATION

Format for Specifying Filenames and URLs in Junos OS CLI Commands | 67

file compare

IN THIS SECTION

- Syntax | 146
- Description | 146
- Options | 147
- Required Privilege Level | 147
- Output Fields | 147
- Sample Output | 147
- Release Information | 149

Syntax

```
file compare (files filename filename)
<context | unified>
<ignore-white-space>
```

Description

Compare two local files and describe the differences between them in default, context, or unified output styles:

- `Default`—In the first line of output, `c` means lines were changed between the two files, `d` means lines were deleted between the two files, and `a` means lines were added between the two files. The numbers preceding this alphabetical marker represent the first file, and the lines after the alphabetical marker represent the second file. A left angle bracket (<) in front of output lines refers to the first file. A right angle bracket (>) in front of output lines refers to the second file.
- `Context`—The display is divided into two parts. The first part is the first file; the second part is the second file. Output lines preceded by an exclamation point (!) have changed. Additions are marked with a plus sign (+), and deletions are marked with a minus sign (-).
- `Unified`—The display is preceded by the line number from the first and the second file (*xx,xxx,x*). Before the line number, additions to the file are marked with a plus sign (+), and deletions to the file

are marked with a minus sign (-). The body of the output contains the affected lines. Changes are viewed as additions plus deletions.

Options

files *filename*	Names of two local files to compare.
context	(Optional) Display output in context format.
ignore-white-space	(Optional) Ignore changes in the amount of white space.
unified	(Optional) Display output in unified format.

Required Privilege Level

none

Output Fields

When you enter this command, you are provided feedback on the status of your request.

Sample Output

file compare files

```
user@host> file compare files /tmp/one /tmp/two
100c100
<             full-name "File 1";
---
>             full-name "File 2";
102c102
<             class foo; # 'foo' is not defined
---
>             class super-user;
```

file compare files context

```
user@host> file compare files /tmp/one /tmp/two context
*** /tmp/one    Wed Dec  3 17:12:50 2003
```

```
--- /tmp/two    Wed Dec  3 09:13:14 2003
***************
*** 97,104 ****
              }
          }
          user bill {
!             full-name "Bill Smith";
!             class foo; # 'foo' is not defined
              authentication {
                  encrypted-password $ABC123;
              }
--- 97,105 ----
              }
          }
          user bill {
!             full-name "Bill Smith";
!             uid 1089;
!             class super-user;
              authentication {
                  encrypted-password $ABC123;
              }
```

file compare files unified

```
user@host> file compare files /tmp/one /tmp/two unified
--- /tmp/one    Wed Dec  3 17:12:50 2003
+++ /tmp/two    Wed Dec  3 09:13:14 2003
@@ -97,8 +97,9 @@
             }
         }
         user bill {
-            full-name "Bill Smith";
-            class foo; # 'foo' is not defined
+            full-name "Bill Smith";
+            uid 1089;
+            class super-user;
             authentication {
                 encrypted-password $ABC123;
             }
```

file compare files unified ignore-white-space

```
user@host> file compare files /tmp/one /tmp/two unified ignore-white-space
--- /tmp/one    Wed Dec  3 09:13:10 2003
+++ /tmp/two    Wed Dec  3 09:13:14 2003
@@ -99,7 +99,7 @@
         user bill {
             full-name "Bill Smith";
             uid 1089;
-            class foo; # 'foo' is not defined
+            class super-user;
             authentication {
                  encrypted-password $ABC123; # SECRET-DATA
             }
```

Release Information

Command introduced before Junos OS Release 7.4.

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Format for Specifying Filenames and URLs in Junos OS CLI Commands | 67

Viewing Core Files from Junos OS Processes

file copy

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Syntax

```
file copy source destination
<source-addresssource-address>
<staging-directory directory-location>
```

Description

Copy files from one location to another location on the local device or to a location on a remote device reachable by the local device.

For information on valid file name and URL formats, see "Format for Specifying Filenames and URLs in Junos OS CLI Commands" on page 67.

CAUTION: Starting with Junos OS Release 15.1, the `sslv3-support` option is not available for configuration with the `set system services xnm-ssl` and `file copy` commands. SSLv3 is no longer supported and available.

For all releases prior to and including Junos OS Release 14.2, SSLv3 is disabled by default at runtime. The `sslv3-support` option is hidden and deprecated in Junos OS Release 14.2 and earlier releases. However, you can use the `set system services xnm-ssl sslv3-support` command to enable SSLv3 for a Junos XML protocol client application to use as the protocol to connect to the Junos XML protocol server on a router, and you can use the `file copy source destination sslv3-support` command to enable the copying of files from an SSLv3 URL.

Using SSLv3 presents a potential security vulnerability, and we recommend that you not use SSLv3. For more details about this security vulnerability, see the Juniper Networks Knowledge Base articlehere.

NOTE: If you define an ordered set of ciphers, key exhange methods, or message authentication codes (MACs) at the `[edit system services ssh]` hierarchy level, the newly-defined set is used when copying files using secure copy protocol (scp). For more information, see *Configuring the SSH Service to Support Legacy Cryptography*.

Options

source	Specify the source URL.

destination	Specify the destination URL.
source-address *source-address*	(Optional) Specify the local address to use in originating the connection.
staging-directory *directory-location*	(Optional) Specify the staging directory on Routing Engine

NOTE: If you are using a literal IPv6 address in your command entry, the address must be enclosed in [ ] brackets. This conforms to RFC 2732.

Required Privilege Level

maintenance

Sample Output

Following are some `file copy` examples.

Copy a File from the Local Device to a Personal Computer

```
user@host> file copy /var/tmp/rpd.core.4 mypc:/c/junipero/tmp

...transferring.file..... |          0 KB |   0.3 kB/s | ETA: 00:00:00 | 100%
```

Copy a Configuration File between Routing Engines

The following sample command copies a configuration file from Routing Engine 0 to Routing Engine 1:

```
user@host> file copy /config/juniper.conf re1:/var/tmp/copied-juniper.conf
```

Copy a File Using File Transfer Protocol which Requires a Password

You can use FTP with the `file copy` command for additional privacy. You will be prompted for a password. The password will display using * symbols when viewing interactive logs. Enter the following command to enable FTP:

```
root@host> file copy filename ftp://user@hostname/filename
```

In the following example, **/config/juniper.conf** is the local file and **hostname** is the FTP server:

```
root@host> file copy /config/juniper.conf ftp://user@hostname/juniper.conf
Password: ******
Receiving ftp: //user@hostname/juniper.conf (2198 bytes): 100%
2198 bytes transferred in 0.0 seconds (2.69 MBps)
```

NOTE: Starting in Junos OS Evolved release 22.2R2, the password prompt has changed from `Password for user@hostname:` to `Password:`

Copy a File Using a Staging Directory

The following sample command copies a file using a staging directory

```
user@host> file copy re1:/var/tmp/junos-install-x.log /root/ staging-directory /var/tmp/tmp1
```

Release Information

Command introduced before Junos OS Release 7.4.

`source-address` option added in Junos OS Release 7.4.

`staging-directory` option added in Junos OS Release 17.3R1.

RELATED DOCUMENTATION

Format for Specifying Filenames and URLs in Junos OS CLI Commands | 67

Default Directories for Junos OS File Storage on the Network Device | 22

file list

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Syntax

```
file list <detail | recursive> <path>
```

Description

Display a list of files on the local router or switch.

Options

none Display a list of files in the default directory. The default directory is the home directory of the user logged in to the router or switch.

detail (Optional) Display detailed information about the files. The output is similar to what is displayed by the Linux `ls -l` command.

recursive (Optional) Display detailed information about the files in the directory and all subdirectories below it.

path (Optional) List the files in a specified directory path. The path name cannot contain any special characters (`![ =;|(){}]`).

Additional Information

To view available directories, enter a space and then a slash (/) after the `file list` command. To view files within a specific directory, include a slash followed by the directory and, optionally, subdirectory name after the `file list` command.

Required Privilege Level

maintenance

Sample Output

file list

The following command lists the contents of the **/var/tmp** directory.

```
user@host> file list /var/tmp

/var/tmp:
trace_debug
package.log
pics/
downloads/
```

file list (detailed)

The following command lists detailed information about the contents of the **/var/tmp** directory.

```
user@host> file list /var/tmp detail

/var/tmp/:
total blocks: 4276224
-rw-r--r--  1 user  group       1362 Oct 16 11:11 trace_debug
-rw-r--r--  1 user  group        108 Aug 9   2016 package.log
drwxrwxrwx  2 user  group        512 Jun 30  2016 pics/
drwxr-xr-x  3 user  group        512 Aug 9   2016 downloads/
total files: 2
```

file list (recursive)

The following command lists detailed information about the contents of the **/var/tmp** directory and all subdirectories below it.

```
user@host> file list /var/tmp recursive

/var/tmp/:
total blocks: 4276224
-rw-r--r--  1 user  group       1362 Oct 16 11:11 trace_debug
-rw-r--r--  1 user  group        108 Aug 9   2016 package.log
drwxrwxrwx  2 user  group        512 Jun 30  2016 pics/
drwxr-xr-x  3 user  group        512 Aug 9   2016 downloads/
total files: 2

/var/tmp/pics:
total blocks: 5120461
-rw-r--r--  1 user  group       1910 Oct 15  2016 image3.png
-rw-r--r--  1 user  group       1852 Oct 15  2016 image2.png
-rw-r--r--  1 user  group       1310 Aug 9   2016 image1.png
total files: 3

/var/tmp/downloads:
total blocks: 24
-rw-r--r--  1 user  group        108 Aug 21  2016 package2.log
-rw-r--r--  1 user  group        108 Aug 9   2016 package1.log
drwxr-xr-x  2 user  group        512 Aug 9   2016 sub-download/
total files: 2

/var/tmp/downloads/sub-download:
total blocks: 16
total files: 0
```

Release Information

Command introduced before Junos OS Release 7.4.

file rename

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Syntax

```
file rename source destination
```

Description

Rename a file on the local router or switch.

Options

destination New name for the file.

source Original name of the file. For a routing matrix, the filename must include the chassis information.

Required Privilege Level

maintenance

Output Fields

When you enter this command, you are provided feedback on the status of your request.

Sample Output

file rename

The following example lists the files in **/var/tmp**, renames one of the files, and then displays the list of files again to reveal the newly named file.

```
user@host> file list /var/tmp
dcd.core
rpd.core
snmpd.core
```

```
user@host> file rename /var/tmp/dcd.core /var/tmp/dcd.core.990413
```

```
user@host> file list /var/tmp
dcd.core.990413
rpd.core
snmpd.core
```

file rename (Routing Matrix)

The following example lists the files in **/var/tmp**, renames one of the files, and then displays the list of files again to reveal the newly named file.

```
user@host> file list lcc0-re1:/var/tmp
lcc0-re1:
--------------------------------------------------------------------------

/var/tmp:
.pccardd
sartre.conf
snmpd
syslogd.core-tarball.0.tgz

user@host> file rename lcc0-re0:/var/tmp/snmpd /var/tmp/snmpd.rr
user@host> file list lcc0-re1:/var/tmp
lcc0-re1:
```

```
------------------------------------------------------------------------

/var/tmp:
.pccardd
sartre.conf
snmpd.rr
syslogd.core-tarball.0.tgz
```

Release Information

Command introduced before Junos OS Release 7.4.

file show

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Syntax

```
file show filename
<encoding (base64 | raw)>
```

Description

Display the contents of a file.

Options

filename	Name of a file. For a routing matrix, the file name must include the chassis information.
encoding (base64 | raw)	(Optional) Encode file contents with base64 encoding or show raw text.

Required Privilege Level

maintenance

Output Fields

When you enter this command, you are provided feedback on the status of your request.

Sample Output

file show

```
user@host> file show /var/log/messages
Apr 13 21:00:08 dev1 /kernel: so-1/1/2: loopback suspected; going to standby.
Apr 13 21:00:40 dev1 /kernel: so-1/1/2: loopback suspected; going to standby.
Apr 13 21:02:48 dev1 last message repeated 4 times
Apr 13 21:07:04 dev1 last message repeated 8 times
Apr 13 21:07:13 dev1 /kernel: so-1/1/0: Clearing SONET alarm(s) RDI-P
Apr 13 21:07:29 dev1 /kernel: so-1/1/0: Asserting SONET alarm(s) RDI-P
...
```

file show (Routing Matrix)

```
user@host> file show lcc0-re0:/var/tmp/.gdbinit
lcc0-re0:
------------------------------------------------------------------------
######################################################################
# Settings
######################################################################

set print pretty
```

```
########################################################################
# Basic stuff
########################################################################

define msgbuf
        printf "%s", msgbufp->msg_ptr
end
# hex dump of a block of memory
# usage: dump address length
define dump
   p $arg0, $arg1
   set $ch = $arg0
   set $j = 0
   set $n = $arg1
   while ($j < $n)
        #printf "%x %x ",&$ch[$j],$ch[$j]
        printf "%x ",$ch[$j]
        set $j = $j + 1
        if (!($j % 16))
                printf "\n"
        end
   end
end
```

Release Information

Command introduced before Junos OS Release 7.4.

CHAPTER 9

System Software Administrative Commands

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clear system reboot

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Syntax

```
clear system reboot
<both-routing-engines>
```

Syntax (EX Series Switches)

```
clear system reboot
<all-members>
<both-routing-engines>
<local>
<member member-id>
```

Syntax (TX Matrix Router)

```
clear system reboot
<both-routing-engines>
<all-chassis | all-lcc | lcc number / scc>
```

Syntax (TX Matrix Plus Router)

```
clear system reboot
<both-routing-engines>
<all-chassis | all-lcc | lcc number | sfc number>
```

Syntax (QFX Series)

```
clear system reboot
<infrastructure name>
<interconnect-device name>
<node-group name>
```

Description

Clear any pending system software reboots or halts. When issued on a TX Matrix router without any options, the default behavior clears all pending system software reboots or halts on all T640 routers connected to the TX Matrix router. When issued on a TX Matrix Plus router without any options, the default behavior clears all pending system software reboots or halts on all T1600 or T4000 routers connected to the TX Matrix Plus router.

Options

none	Clear all pending system software reboots or halts.
all-chassis	(TX Matrix routers and TX Matrix Plus routers only) (Optional) Clear all halt or reboot requests for all the Routing Engines in the chassis.
all-lcc	(TX Matrix routers and TX Matrix Plus routers only) (Optional) On a TX Matrix router, clear all halt or reboot requests for all T640 routers (or line-card chassis)

connected to the TX Matrix router. On a TX Matrix Plus router, clear all halt or reboot requests on the l connected T1600 or T4000 LCCs.

all-members (EX4200 switches only) (Optional) Clear all halt or reboot requests on all members of the Virtual Chassis configuration.

both-routing-engines (Systems with multiple Routing Engines) (Optional) Clear all halt or reboot requests on both Routing Engines. On a TX Matrix router, clear both Routing Engines on all chassis connected to the TX Matrix router. Likewise, on a TX Matrix Plus router, clear both Routing Engines on all chassis connected to the TX Matrix Plus router.

infrastructure *name* (QFabric systems) (Optional) Clear all halt or reboot requests on the fabric control Routing Engines or fabric manager Routing Engines.

interconnect-device *name* (QFabric systems) (Optional) Clear all halt or reboot requests on the Interconnect device.

lcc *number* (TX Matrix routers and TX Matrix Plus routers only) (Optional) On a TX Matrix router, clear all halt or reboot requests for a specific T640 router that is connected to the TX Matrix router. On a TX Matrix Plus router, clear all halt or reboot requests for a specific router that is connected to the TX Matrix Plus router.

Replace *number* with the following values depending on the LCC configuration:

- 0 through 3, when T640 routers are connected to a TX Matrix router in a routing matrix.
- 0 through 3, when T1600 routers are connected to a TX Matrix Plus router in a routing matrix.
- 0 through 7, when T1600 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.
- 0, 2, 4, or 6, when T4000 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.

local (EX4200 switches only) (Optional) Clear all halt or reboot requests on the local Virtual Chassis member.

member *member-id* (EX4200 switches only) (Optional) Clear all halt or reboot requests on the specified member of the Virtual Chassis configuration. Replace *member-id* with a value from 0 through 9.

node-group *name* (QFabric systems) (Optional) Clear all halt or reboot requests on the Node group.

scc	(TX Matrix routers only) (Optional) Clear all halt or reboot requests for the TX Matrix router (or switch-card chassis).
sfc *number*	(TX Matrix Plus routers only) (Optional) Clear all halt or reboot requests for the TX Matrix Plus router. Replace *number* with 0.

Required Privilege Level

maintenance

Output Fields

When you enter this command, you are provided feedback on the status of your request.

Sample Output

clear system reboot

```
user@host> clear system reboot
reboot requested by root at Sat Dec 12 19:37:34 1998
[process id 17855]
Terminating...
```

clear system reboot (TX Matrix Router)

```
user@host> clear system reboot
scc-re0:
--------------------------------------------------------------------------
No shutdown/reboot scheduled.
lcc0-re0:
--------------------------------------------------------------------------
No shutdown/reboot scheduled.
lcc2-re0:
--------------------------------------------------------------------------
No shutdown/reboot scheduled.
```

clear system reboot (QFX Series)

```
user@switch> clear system reboot node-group node1
No shutdown/reboot scheduled.
```

Release Information

Command introduced before Junos OS Release 7.4.

`sfc` option introduced for the TX Matrix Plus router in Junos OS Release 9.6.

RELATED DOCUMENTATION

request system reboot

Routing Matrix with a TX Matrix Plus Router Solutions Page

request flight-recorder set high-cpu

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Syntax

```
request flight-recorder set high-cpu
<disable>
```

```
<backoff-duration seconds>
<collect-core>
<cpu-threshold percentage>
<logical-system>
<num-snapshots number>
<polling-frequency frequency>
```

Description

Enable flight recorder tool to collect snapshots of historical data on when the CPU utilization for the routing protocol process on a device was high and what processes caused the high utilization. The detection of high CPU usage enables faster resolution of issues.

The recorded snapshots and core files are saved as log files in a folder under the **/var/log/flight_recorder/** directory. The log files are listed in the order of time stamp saved. The folder format is `Flr_MONTH_DD_YYYY_HH:MM:SS`; for example, `Flr_May_09_2018_02:20:50`. Each log file in the directory includes the following information:

- Output from the `show task accounting detail` command (after enabling and waiting for 10 seconds).
- Output from the `show task jobs` command.
- Running core data stored in a separate core log file, if enabled.

Options

none — Enable flight recorder tool to collect snapshots of data used for detecting high CPU utilization. The recorded snapshots and core files are saved as log files in a folder under the **/var/log/flight_recorder/**.

disable — Disable flight recorder tool that has been enabled using the `request flight-recorder set high-cpu` command.

- **Default:** Disabled.

backoff-duration *seconds* — (Optional) Specify the time interval in seconds between two snapshots of data.

- **Default:** 100 seconds.
- **Range:** 10 through 1000.

collect-core — (Optional) Perform snapshot collection of the running core with every snapshot of data taken.

When the `collect-core` option is enabled, the data snapshots are stored in a separate core log file in a folder under the **/var/log/flight_recorder/** directory. The folder format is `Flr_MONTH_DD_YYYY_HH:MM:SS`; for example, `Flr_May_09_2018_02:20:50`.

- **Default:** Disabled.

cpu-threshold *percentage*

(Optional) Specify the maximum value of CPU utilization in percentage, beyond which the collection of data is triggered.

- **Default:** 80
- **Range:** 1 through 400.

logical-system

(Optional) Enable data collection on logical systems.

- **Default:** Disabled.

num-snapshots *number*

(Optional) Specify the number of snapshots of data to be collected before quitting the collection process.

- **Default:** 0
- **Range:** 1 through 20

polling-frequency *seconds*

(Optional) Specify the time in seconds for polling for high CPU utilization.

- **Default:** 10 seconds.
- **Range:** 5 through 100.

Required Privilege Level

root

Output Fields

When you enter this command, you are provided feedback on the status of your request.

Sample Output

request flight-recorder set high-cpu (Enable flight-recorder)

```
user@host> request flight-recorder set high-cpu cpu-threshold 10 polling-frequency 5 backoff-duration 10 collect-core num-snapshots 1
Please wait....Starting flight-recorder process.
```

request flight-recorder set high-cpu disable (When flight-recorder is enabled)

```
user@host> request flight-recorder set high-cpu disable
Disabling Done
```

request flight-recorder set high-cpu disable (When flight-recorder is disabled)

```
user@host> request flight-recorder set high-cpu disable
Flight Recorder is not running!
```

Release Information

Command introduced in Junos OS Release 18.2R1.

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show flight-recorder status | 273

request message

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Syntax

```
request message all message "text"
request message message "text" (terminal terminal-name  | user user-name)
```

Description

Display a message on the screens of all users who are logged in to the router or switch or on specific screens.

Options

all	Display a message on the terminal of all users who are currently logged in.
message "*text*"	Message to display.
terminal *terminal-name*	Name of the terminal on which to display the message.
user *user-name*	Name of the user to whom to direct the message.

Required Privilege Level

maintenance

Output Fields

When you enter this command, you are provided feedback on the status of your request.

Sample Output

request message message

```
user@host> request message message "Maintenance window in 10 minutes" user maria
Message from user@host on ttyp0 at 20:27 ...
Maintenance window in 10 minutes
EOF
```

Release Information

Command introduced before Junos OS Release 7.4.

request system configuration database resize

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Syntax

```
request system configuration database resize
<force>
<re0 | re1>
<routing-engine backup | master | both | local>
```

Description

You might require to perform a resizing of the configuration database as a result of performing frequent load replacement operations which replaces the configuration hierarchy with the new configuration. When this occurs, deleted objects store in the database, and the memory allocated in the database is freed after the commit is completed. However, during this process the database size on disk can grow although the actual configuration size is actually less.

The `request system configuration database resize` command provides you with a manual method to resize the configuration database. The system will display `Database resize completed` when the configuration database has been successfully resized.

Use the `show system configuration database usage` command to display configuration database disk space usage statistics. The Current database size on disk field will display the change in database size related to the use of the `resize` command. See show system configuration database usage.

Options

force (Optional) If there are uncommitted changes and you execute the `request system configuration database resize` command, the command will fail and an error will be generated (`error: Database resize failed, Configuration Database Modified.`). To execute the command when this occurs, use the `force` option to discard the uncommitted changes.

re0 | re1 (Optional) If a router has dual Routing Engines, `re0` and `re1` identify the specific routing engine that is to execute the `request system configuration database resize` command. `re0` is for the Routing Engine in slot 0 and `re1` is for the Routing Engine in slot 1.

routing-engine (Optional) To execute the `request system configuration database resize` command on a specific routing engine, or on both routing engines, in a redundant configuration you can specify one of the following:

- backup—Resizes the configuration database on the backup routing engine in a redundant configuration.
- primary—Resizes the configuration database on the primary routing engine in a redundant configuration.
- both—Resizes the configuration database on both routing engines.
- local—Resizes the configuration database on the local routing engine.

Additional Information

Include below is a set of usage guidelines when using the `request system configuration database resize` command:

- All other configuration sessions will be closed on the routing engine to remove the old mappings to the configuration database.
- This command cannot be run from configuration mode.
- Do not execute the `request system configuration database resize` command when a commit is in progress.
- During the time when the `request system configuration database resize` command is in progress, a new configuration session cannot be opened. A warning message will appear instructing you that the configuration database is being resized (`warning: Database is being resized`).
- If there are uncommitted changes and the command is executed, the command will fail and an error will be generated (`error: Database resize failed, Configuration Database Modified.`). To execute the command when this occurs, use the `force` option to discard the uncommitted changes.
- To execute the command on both routing engines use the `request system configuration database resize routing-engine both` command.
- Do not terminate the command when it is in progress (for example, by specifying **Ctrl+c** or **Ctrl+z**).

Required Privilege Level

maintenance

Output Fields

Sample Output

request system configuration database resize

```
user@host> show system configuration database usage
Maximum size of the database: 1309.99 MB
Current database size on disk: 500.00 MB
Actual database usage: 176.81 MB
Available database space: 1133.18 MB

user@host> request system configuration database resize
```

```
Database resize completed
user@host> show system configuration database usage
Maximum size of the database: 1309.99 MB
Current database size on disk: 176.50 MB
Actual database usage: 176.48 MB
Available database space: 1133.52 M
```

Release Information

Command introduced in Junos OS Release 17.2R1.

request system halt

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Syntax

```
request system halt
<at time>
<backup-routing-engine>
<both-routing-engines>
<other-routing-engine>
<in minutes>
<media (compact-flash | disk | removable-compact-flash | usb)>
<message "text">
```

Syntax (EX Series Switches)

```
request system halt
<all-members>
<at time>
<backup-routing-engine>
<both-routing-engines>
<in minutes>
<local>
<media (external | internal)>
<member member-id>
<message "text">
<other-routing-engine>
<slice slice>
```

Syntax (PTX Series)

```
request system halt
<at time>
<backup-routing-engine>
<both-routing-engines>
<other-routing-engine>
<in minutes>
<media (compact-flash | disk)>
<message "text">
```

Syntax (MX Series Router)

```
request system halt
<all-members>
<at time>
<backup-routing-engine>
<both-routing-engines>
<in minutes>
<local>
<media (external | internal)>
<member member-id>
<message "text">
<other-routing-engine>
```

Syntax (QFX Series)

```
request system halt
<all-members>
<at time>
<both-routing-engines>
<director-device director-device-id>
<in minutes>
<local>
<media >
<member member-id>
<message "text">
<other-routing-engine>
<slice slice>
```

Syntax (SRX Series)

```
request system halt
<at time>
<in minutes>
<media (compact-flash | disk | usb)>
<message "text">
```

Description

Stop the device software.

NOTE: When you issue this command on an individual component—for example, a Node device—in a QFabric system, you will receive a warning that says "Hardware-based members will halt, Virtual Junos Routing Engines will reboot." If you want to halt only one member of a Node group, issue this command with the `member` option on the Node device CLI, because you cannot issue this command from the QFabric CLI. Also, issuing this command might cause traffic loss on an individual component.

When you issue this command on a QFX5100 switch, you are not prompted to reboot. You must power cycle the switch to reboot.

NOTE: For the routers with the Routing Engines RE-S-2x00x6, RE-PTX-2x00x8, and RE-S-2x00x8, this command is deprecated and might be removed completely in a future release.

On these routers, this command is replaced with the `request vmhost halt` command which provides similar functionality.

Options

none — Stop the router or switch software immediately.

all-members — (Optional) Halt all members of the Virtual Chassis configuration.

at *time* — (Optional) Time at which to stop the software, specified in one of the following ways:

- `now`—Stop the software immediately. This is the default.
- `+`*`minutes`*—Number of minutes from now to stop the software.
- *`yymmddhhmm`*—Absolute time at which to stop the software, specified as year, month, day, hour, and minute.
- *`hh:mm`*—Absolute time on the current day at which to stop the software.

backup-routing-engine — (Optional) Halt the backup Routing Engine. This command halts the backup Routing Engine, regardless from which Routing Engine the command is executed. For example, if you issue the command from the primary Routing Engine, the backup

	Routing Engine is halted. If you issue the command from the backup Routing Engine, the backup Routing Engine is halted.
both-routing-engines	(Optional) Halt both Routing Engines at the same time.
director-device *director-device-id*	(QFabric systems only) Halt a specific Director device.
local	(Optional) Halt the local Virtual Chassis member.
in *minutes*	(Optional) Number of minutes from now to stop the software. This option is an alias for the at +*minutes* option.
media (compact-flash /disk)	(Optional) Boot medium for the next boot.
media (external | internal)	(EX Series and QFX Series switches and MX Series routers only) (Optional) Halt the boot media: • `external`—Halt the external mass storage device. • `internal`—Halt the internal flash device.
media (compact-flash | disk | usb)	(SRX Series only) (Optional) Boot media for the next boot. • `compact-flash`— Standard boot from a flash device. • `disk`— Boot from a hard disk. • `usb`— Boot from a USB device.
member *member-id*	(Optional) Halt the specified member of the Virtual Chassis configuration. For an MX Series Virtual Chassis, *`member-id`* can only be 0 or 1.
message "*text***"**	(Optional) Message to display to all system users before stopping the software.
other-routing-engine	(Optional) Halt the other Routing Engine from which the command is issued. For example, if you issue the command from the primary Routing Engine, the backup Routing Engine is halted. Similarly, if you issue the command from the backup Routing Engine, the primary Routing Engine is halted.
slice *slice*	(EX Series and QFX Series switches only) (Optional) Halt a partition on the boot media. This option has the following suboptions: • 1—Halt partition 1.

- 2—Halt partition 2.
- `alternate`—Reboot from the alternate partition.

Additional Information

On the M7i router, the `request system halt` command does not immediately power down the Packet Forwarding Engine. The power-down process can take as long as 5 minutes.

Required Privilege Level

maintenance

Output Fields

When you enter this command, you are provided feedback on the status of your request.

Sample Output

request system halt

```
user@host> request system halt
Halt the system ? [yes,no] (no) yes

*** FINAL System shutdown message from root@section2 ***
System going down IMMEDIATELY
Terminated
...
syncing disks... 11 8 done
The operating system has halted.
Please press any key to reboot.
```

request system halt (SRX Series)

```
user@host> request system halt
Halt the system ? [yes,no] (no) yes

*** FINAL System shutdown message from user@host ***
```

```
System going down IMMEDIATELY


Shutdown NOW!
[pid 7560]

user@host> Dec  8 08:57:37 Waiting (max 60 seconds) for system process `vnlru' to stop...done
Waiting (max 60 seconds) for system process `vnlru_mem' to stop...done
Waiting (max 60 seconds) for system process `bufdaemon' to stop...done
Waiting (max 60 seconds) for system process `syncer' to stop...
Syncing disks, vnodes remaining...2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0 0 0 0 0 0 done

syncing disks... All buffers synced.
Uptime: 2d16h25m9s
recorded reboot as normal shutdown

The operating system has halted.
Please press any key to reboot.
```

request system halt (In 2 Hours)

The following example, which assumes that the time is 5 PM (1700), illustrates three different ways to request that the system stop 2 hours from now:

```
user@host> request system halt at +120
user@host> request system halt in 120
user@host> request system halt at 19:00
```

request system halt (Immediately)

```
user@host> request system halt at now
```

request system halt (At 1:20 AM)

To stop the system at 1:20 AM, enter the following command. Because 1:20 AM is the next day, you must specify the absolute time.

```
user@host> request system halt at yymmdd\20
request system halt at 120
Halt the system at 120? [yes,no] (no) yes
```

Release Information

Command introduced before Junos OS Release 7.4.

`other-routing-engine` option introduced in Junos OS Release 8.0.

`director-device` option introduced for QFabric systems in Junos OS Release 12.2.

`backup-routing-engine` option introduced in Junos OS Release 13.1.

RELATED DOCUMENTATION

- clear system reboot
- request system power-off
- request vmhost halt

request system logout

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Syntax

```
request system logout (pid pid / terminal terminal / user username)
<all>
```

Description

Log out users from the router or switch and the configuration database. If a user held the `configure exclusive` lock, this command clears the exclusive lock.

Options

all	(Optional) Log out all sessions owned by a particular PID, terminal session, or user. (On a TX Matrix or TX Matrix Plus router, this command is broadcast to all chassis.)
pid *pid*	Log out the user session using the specified management process identifier (PID). The PID type must be management process.
terminal *terminal*	Log out the user for the specified terminal session.
user *username*	Log out the specified user.

Required Privilege Level

configure

Output Fields

When you enter this command, you are provided feedback on the status of your request.

Sample Output

request system logout

```
user@host> request system logout user test all
Connection closed by foreign host.
```

Release Information

Command introduced before Junos OS Release 7.4.

RELATED DOCUMENTATION

- Log a User Out of the Device | 82

request system partition abort

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Syntax

```
request system partition abort
```

Syntax (TX Matrix Router)

```
request system partition abort
<all-chassis | all-lcc | lcc number | scc>
```

Syntax (TX Matrix Plus Router)

```
request system partition abort
<all-chassis | all-lcc | lcc number | sfc number>
```

Syntax (MX Series Router)

```
request system partition abort
<all-members>
<local>
<member member-id>
```

Description

Terminate a previously scheduled storage media partition operation. If the command is issued between the time of a partition request and a reboot, the partition request is terminated and the storage media is not affected.

Options

all-chassis (TX Matrix and TX Matrix Plus routers only) (Optional) Terminate a previously scheduled partition operation for all chassis.

all-lcc (TX Matrix and TX Matrix Plus routers only) (Optional) On a TX Matrix router, terminate a previously scheduled partition operation on all T640 routers (line-card chassis) connected to the TX Matrix router. On a TX Matrix Plus router, terminate a previously

scheduled partition operation on all routers (line-card chassis) connected to the TX Matrix Plus router.

all-members (MX Series routers only) (Optional) Terminate a previously scheduled partition operation for all members of the Virtual Chassis configuration.

lcc *number* (TX Matrix and TX Matrix Plus routers only) (Optional) On a TX Matrix Plus router, terminate a previously scheduled partition operation on a specific T640 router that is connected to the TX Matrix router. On a TX Matrix Plus router, terminate a previously scheduled partition operation on a specific router that is connected to the TX Matrix Plus router.

Replace *number* with the following values depending on the LCC configuration:

- 0 through 3, when T640 routers are connected to a TX Matrix router in a routing matrix.
- 0 through 3, when T1600 routers are connected to a TX Matrix Plus router in a routing matrix.
- 0 through 7, when T1600 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.
- 0, 2, 4, or 6, when T4000 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.

local (MX Series routers only) (Optional) Terminate a previously scheduled partition operation for the local Virtual Chassis member.

member *member-id* (MX Series routers only) (Optional) Terminate a previously scheduled partition operation for the specified member of the Virtual Chassis configuration. Replace *member-id* with a value of 0 or 1.

scc (TX Matrix routers only) (Optional) Terminate a previously scheduled partition operation on the TX Matrix router (or switch-card chassis).

sfc *number* (TX Matrix Plus routers only) (Optional) Terminate a previously scheduled partition operation on the TX Matrix Plus router (or switch-fabric chassis). Replace *number* with 0.

Required Privilege Level

maintenance

Output Fields

When you enter this command, you are provided feedback on the status of your request.

Sample Output

request system partition terminate

```
user@host> request system partition abort
The hard disk is no longer scheduled to be partitioned.
```

Release Information

Command introduced before Junos OS Release 7.4.

`sfc` option introduced for the TX Matrix Plus router in Junos OS Release 9.6.

Command deprecated for Junos OS with Upgraded FreeBSD in Junos OS Release 15.1.

NOTE: To determine which platforms run Junos OS with Upgraded FreeBSD, see the table listing the platforms currently running Junos OS with upgraded FreeBSD in Release Information for Junos OS with Upgraded FreeBSD.

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request system partition hard-disk

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Syntax

```
request system partition hard-disk
```

Syntax (TX Matrix Router)

```
request system partition hard-disk
<all-chassis | all-lcc | lcc number | scc>
```

Syntax (TX Matrix Plus Router)

```
request system partition hard-disk
<all-chassis | all-lcc | lcc number | sfc number>
```

Syntax (MX Series Router)

```
request system partition hard-disk
<all-members>
<local>
<member member-id>
```

Description

Set up the hard disk for partitioning. After this command is issued, the hard disk is partitioned the next time the system is rebooted. When the hard disk is partitioned, the contents of **/altroot** and **/altconfig** are saved and restored. All other data on the hard disk is at risk of being lost.

Options

all-chassis (TX Matrix routers and TX Matrix Plus routers only) (Optional) Schedule a partition of the hard disk for all routers in the chassis at its next reboot.

all-lcc (TX Matrix and TX Matrix Plus routers only) (Optional) On a TX Matrix router, schedule a partition of the hard disk on all T640 routers connected to the TX Matrix router at their next reboot. On a TX Matrix Plus router, schedule a partition of the hard disk on all connected LCCs.

all-members (MX Series routers only) (Optional) Schedule a partition of the hard disk for all members of the Virtual Chassis configuration.

lcc *number* (TX Matrix routers and TX Matrix Plus routers only) (Optional) On a TX Matrix Plus router, schedule a partition of the hard disk on a specific T640 router connected to the TX Matrix router. On a TX Matrix Plus router, schedule a partition of the hard disk on a specific router that is connected to the TX Matrix Plus router.

Replace *number* with the following values depending on the LCC configuration:

- 0 through 3, when T640 routers are connected to a TX Matrix router in a routing matrix.
- 0 through 3, when T1600 routers are connected to a TX Matrix Plus router in a routing matrix.
- 0 through 7, when T1600 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.
- 0, 2, 4, or 6, when T4000 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.

local (MX Series routers only) (Optional) Schedule a partition of the hard disk for the local member of the Virtual Chassis.

member *member-id* (MX Series routers only) (Optional) Schedule a partition of the hard disk for the specified member of the Virtual Chassis configuration. Replace *member-id* with a value of 0 or 1.

scc (TX Matrix routers only) (Optional) Schedule a partition of the hard disk on the T640 router connected to the TX Matrix router (or switch-card chassis).

sfc *number* (TX Matrix Plus routersonly) (Optional) Schedule a partition of the hard disk on the connected T1600 or T4000 LCCs connected to the TX Matrix Plus router . Replace *number* with 0.

Additional Information

To immediately partition the hard disk, use the `request system reboot` command. To cancel the partition request, use the `request system partition abort` command.

Required Privilege Level

maintenance

Output Fields

When you enter this command, you are provided feedback on the status of your request.

Sample Output

request system partition hard-disk

```
user@host> request system partition hard-disk
WARNING:   The hard disk is about to be partitioned.  The contents
WARNING:   of /altroot and /altconfig will be saved and restored.
WARNING:   All other data is at risk.  This is the setup stage, the
WARNING:   partition happens during the next reboot.

Setting up to partition the hard disk ...

WARNING:   A REBOOT IS REQUIRED TO PARTITION THE HARD DISK.  Use the
WARNING:   'request system reboot' command when you are ready to proceed
WARNING:   with the partitioning.  To abort the partition of the hard disk
WARNING:   use the 'request system partition abort' command.
```

Release Information

Command introduced before Junos OS Release 7.4.

`sfc` option introduced for the TX Matrix Plus router in Junos OS Release 9.6.

Command deprecated for Junos OS with Upgraded FreeBSD in Junos OS Release 15.1.

NOTE: To determine which platforms run Junos OS with Upgraded FreeBSD, see the table listing the platforms currently running Junos OS with upgraded FreeBSD in Release Information for Junos OS with Upgraded FreeBSD.

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request system power-off

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Syntax

```
request system power-off
<both-routing-engines>
<other-routing-engine>
<at time>
<in minutes>
<media (compact-flash | disk | removable-compact-flash | usb)>
<message "text">
```

Syntax (EX Series Switches)

```
request system power-off
<all-members>
<at time>
<both-routing-engines>
<in minutes>
<local>
<media (external | internal)>
<member member-id>
<message "text">
<other-routing-engine>
<slice slice>
```

Syntax (TX Matrix Router)

```
request system power-off
<all-chassis | all-lcc | lcc number /  scc>
<both-routing-engines>
<other-routing-engine>
<at time>
<in minutes>
```

```
<media (compact-flash | disk)>
<message "text">
```

Syntax (TX Matrix Plus Router)

```
request system power-off
<all-chassis | all-lcc | lcc number /  sfc number>
<both-routing-engines>
<other-routing-engine>
<at time>
<in minutes>
<media (compact-flash | disk)>
<message "text">
```

Syntax (MX Series Router)

```
request system power-off
<all-members>
<at time>
<both-routing-engines>
<in minutes>
<local>
<media (external | internal)>
<member member-id>
<message "text">
<other-routing-engine>
```

Syntax (QFX Series)

```
request system power-off
<at time>
<in minutes>
<media (external | internal)>
<message "text">
<slice slice>
```

Description

Power off the Routing Engines.

NOTE: When you issue this command on an individual component in a QFabric system, you will receive a warning that says “Hardware-based members will halt, Virtual Junos Routing Engines will reboot.” If you want to halt only one member, use the `member` option. You cannot issue this command from the QFabric CLI.

NOTE: For a standalone chassis (such as MX Series, PTX Series, and T Series routers), the request to power off the system is applicable only to the Routing Engines. When you request to power off both Routing Engines, all the FPCs in the chassis shut down after approximately 10 minutes and the chassis fans run at full speed. The FPCs shut down because they no longer have communication with the Routing Engines and an Inter-Integrated Circuit (I2C) timeout occurred.

NOTE: For the routers with Routing Engines RE-S-2x00x6, RE-PTX-2x00x8, and RE-S-2x00x8, this command is deprecated and might be removed completely in a future release.

On these routers, this command is replaced with the `request vmhost power-off` command which provides similar functionality.

Options

none Power off the router or switch software immediately.

all-chassis (Optional) (TX Matrix and TX Matrix Plus router only) Power off all Routing Engines in the chassis.

all-lcc (Optional) (TX Matrix and TX Matrix Plus router only) On a TX Matrix router, power off all T640 routers (or line-card chassis) connected to the TX Matrix router. On a TX Matrix Plus router, power off all T1600 routers (or line-card chassis) connected to the TX Matrix Plus router.

all-members (EX4200 switches and MX Series routers only) (Optional) Power off all members of the Virtual Chassis configuration.

at *time* (Optional) Time at which to power off the software, specified in one of the following ways:

- `now`—Power off the software immediately. This is the default.
- `+`*`minutes`*—Number of minutes from now to power off the software.
- *`yymmddhhmm`*—Absolute time at which to power off the software, specified as year, month, day, hour, and minute.
- *`hh:mm`*—Absolute time on the current day at which to power off the software.

both-routing-engines (Optional) Power off both Routing Engines at the same time.

in *minutes* (Optional) Number of minutes from now to power off the software. This option is an alias for the `at +`*`minutes`* option.

lcc *number* (Optional) (TX Matrix and TX Matrix Plus router only) On a TX Matrix router, power off a T640 router that is connected to the TX Matrix router. On a TX Matrix Plus router, power off a specific router that is connected to the TX Matrix Plus router.

Replace *number* with the following values depending on the LCC configuration:

- 0 through 3, when T640 routers are connected to a TX Matrix router in a routing matrix.
- 0 through 3, when T1600 routers are connected to a TX Matrix Plus router in a routing matrix.
- 0 through 7, when T1600 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.
- 0, 2, 4, or 6, when T4000 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.

local (EX4200 switches and MX Series routers only) (Optional) Power off the local Virtual Chassis member.

media (compact-flash | disk) (Optional) Boot medium for the next boot.

media (external | internal) (EX Series and QFX Series switches and MX Series routers only) (Optional) Power off the boot media:

- `external`—Power off the external mass storage device.
- `internal`—Power off the internal flash device.

member *member-id* (EX4200 switches and MX Series routers only) (Optional) Power off the specified member of the Virtual Chassis configuration. For EX4200 switches, replace *member-id* with a value from 0 through 9. For an MX Series Virtual Chassis, replace *member-id* with a value of 0 or 1.

message "*text*" (Optional) Message to display to all system users before powering off the software.

other-routing-engine (Optional) Power off the other Routing Engine from which the command is issued. For example, if you issue the command from the primary Routing Engine, the backup Routing Engine is halted. Similarly, if you issue the command from the backup Routing Engine, the primary Routing Engine is halted.

scc (Optional) (TX Matrix router only) Power off only the primary Routing Engine or the backup Routing Engine on the TX Matrix router (or switch-card chassis). If you issue the command from the primary Routing Engine, the primary SCC is powered off. If you issue the command from the backup Routing Engine, the backup SCC is powered off.

sfc *number* (Optional) (TX Matrix Plus router only) Power off only the primary Routing Engine or the backup Routing Engine on the TX Matrix Plus router (or switch-fabric chassis). If you issue the command from the primary Routing Engine, the primary SFC is powered off. If you issue the command from the backup Routing Engine, the backup SFC is powered off. Replace *number* with zero.

slice *slice* (EX Series and QFX Series switches only) (Optional) Power off a partition on the boot media. This option has the following suboptions:

- `1`—Power off partition 1.
- `2`—Power off partition 2.
- `alternate`—Reboot from the alternate partition.

Additional Information

On a routing matrix composed of a TX Matrix router and T640 routers, if you issue the `request system power-off` command on the TX Matrix primary Routing Engine, all the primary Routing Engines connected to the routing matrix are powered off. If you issue this command on the backup Routing Engine, all the backup Routing Engines connected to the routing matrix are powered off.

Likewise, on a routing matrix composed of a TX Matrix Plus router and T1600 routers, if you issue the `request system power-off` command on the TX Matrix Plus primary Routing Engine, all the primary Routing Engines connected to the routing matrix are powered off. If you issue this command on the backup Routing Engine, all the backup Routing Engines connected to the routing matrix are powered off.

If you issue the `request system power-off both-routing-engines` command on the TX Matrix or TX Matrix Plus router, all the Routing Engines on the routing matrix are powered off.

Required Privilege Level

maintenance

Output Fields

When you enter this command, you are provided feedback on the status of your request.

Sample Output

request system power-off

```
user@host> request system power-off message “This router will be powered off in 30 minutes.
Please save your data and log out immediately.”
warning: This command will not halt the other routing-engine.
If planning to switch off power, use the both-routing-engines option.
Power Off the system ? [yes,no] (no) yes

*** FINAL System shutdown message from remote@nutmeg ***
System going down IMMEDIATELY

This router will be powered off in 30 minutes. Please save your data and log out
immediately.

Shutdown NOW!
[pid 5177]
```

Release Information

Command introduced in Junos OS Release 8.0.

request system process terminate

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Syntax

```
request system process terminate process-id
```

Description

Terminate any process that you specify with the process identification number (process ID or pid). The `request system process terminate` command is an alternative to using the `restart` command. The `restart` command terminates and restarts a process that you specify by process name, but limits you to only certain well-known processes.

CAUTION: Caution: Never terminate a software process unless instructed to do so by a customer support engineer. Restarting processes could cause unknown system behavior resulting in partial or complete traffic loss.

Use the `show system processes` command to display a list of processes by process ID.

Options

process-id — Identification number for a process.

- **Range:** 1 through 99999

Required Privilege Level

maintenance

Output Fields

When you enter this command, you are not provided feedback on the status of your request. You can use the `show system processes extensive` command to confirm the process that was terminated.

Sample Output

request system process terminate

```
user@host> request system process terminate 1514
```

Release Information

Command introduced before Junos OS Release 7.4.

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Syntax

```
request system reboot
<at time>
<both-routing-engines>
<in minutes>
<media (compact-flash | disk | removable-compact-flash | usb)>
<message "text">
<other-routing-engine>
```

Syntax (EX Series Switches and EX Series Virtual Chassis)

```
request system reboot
<all-members | local | member member-id>
<at time>
<in minutes>
<media (external | internal)> | <media (compact-flash | disk | removable-compact-flash | usb)>
<message "text">
<slice slice>
```

Syntax (MX Series Routers and MX Series Virtual Chassis, EX9200 Switches and EX9200 Virtual Chassis)

```
request system reboot
<all-members | local | member member-id>
<at time>
<both-routing-engines>
<in minutes>
<media (external | internal)> | <media (compact-flash | disk | usb)> | <junos | network | oam |
usb>
<message "text">
<other-routing-engine>
```

Syntax (QFabric Systems)

```
request system reboot
<all <graceful>>
<at time>
<director-device name>
<director-group <graceful>>
<fabric <graceful>>
<in minutes>
<in-service>
<media>
<message “text”>
<node-group name>
<slice slice>
```

Syntax (QFX Series Switches and QFX Series Virtual Chassis, Virtual Chassis Fabric)

```
request system reboot
<all-members | local | member member-id>
<at time>
<in minutes>
<in-service>
<hypervisor>
<junos | network | oam | usb>
```

```
<message “text”>
<slice slice>
```

Syntax (TX Matrix Router)

```
request system reboot
<all-chassis | all-lcc | lcc number /  scc>
<at time>
<both-routing-engines>
<in minutes>
<media (compact-flash | disk)>
<message "text">
<other-routing-engine>
```

Syntax (TX Matrix Plus Router)

```
request system reboot
<all-chassis | all-lcc | lcc number | sfc number>
<at time>
<both-routing-engines>
<in minutes>
<media (compact-flash | disk)>
<message "text">
<other-routing-engine>
<partition (1 | 2 | alternate)>
```

Description

Use this command to reboot the device software.

This command can be used on standalone devices and on devices supported in a Virtual Chassis, Virtual Chassis Fabric, or QFabric system.

Starting with Junos OS Release 15.1F3, the `request system reboot` command reboots only the guest operating system on the PTX5000 with RE-PTX-X8-64G and, MX240, MX480, and MX960 with RE-S-X6-64G.

Starting with Junos OS Release 15.1F5, the `request system reboot` command reboots only the guest operating system on the MX2010, and MX2020 with REMX2K-X8-64G.

Starting from Junos OS Release 17.2R1, PTX10008 routers do not support the `request system reboot` command. Starting from Junos OS Release 17.4R1, PTX10016 routers do not support the `request system reboot` command. Use the `request vmhost reboot` command instead of the `request system reboot` command on the PTX10008 and PTX10016 routers to reboot the Junos OS software package or bundle on the router. See request vmhost reboot.

Starting from Junos OS Release 19.1R1, the PTX10002-60C router and the QFX10002-60C switch do not support the `request system reboot` command. Use the `request vmhost reboot` command instead of the `request system reboot` command on these devices to reboot the Junos OS software package or bundle on the device. See request vmhost reboot.

On a QFabric system, to avoid traffic loss on the network Node group, switch mastership of the Routing Engine to the backup Routing Engine, and then reboot.

Options

The options described here are not all supported on every platform or release of Junos OS. Refer to the Syntax sections for the options commonly available on each type of platform.

none — Reboot the software immediately.

all-chassis — (Optional) On a TX Matrix router or TX Matrix Plus router, reboot all routers connected to the TX Matrix or TX Matrix Plus router, respectively.

all-lcc — (Optional) On a TX Matrix router or TX Matrix Plus router, reboot all line card chassis connected to the TX Matrix or TX Matrix Plus router, respectively.

all-members | local | member ***member-id*** — (Optional) Specify which member of the Virtual Chassis to reboot:

- `all-members`—Reboots each switch that is a member of the Virtual Chassis.
- `local`—Reboots only the local switch (switch where you are logged in).
- `member` *member-id*—Reboots the specified member switch of the Virtual Chassis

at *time* — (Optional) Time at which to reboot the software, specified in one of the following ways:

- `now`—Stop or reboot the software immediately. This is the default.
- *+minutes*—Number of minutes from now to reboot the software.
- *yymmddhhmm*—Absolute time at which to reboot the software, specified as year, month, day, hour, and minute.

- *hh:mm*—Absolute time on the current day at which to stop the software, specified in 24-hour time.

both-routing-engines (Optional) Reboot both Routing Engines at the same time.

fast-boot (Optional, QFX Series) Minimizes traffic loss and downtime of network ports by leaving the network ports up during the system reboot.

hypervisor (Optional) Reboot Junos OS, host OS, and any installed guest VMs.

in *minutes* (Optional) Number of minutes from now to reboot the software. The minimum value is 1. This option is an alias for the `at +minutes` option.

in-service (Optional) Enables you to reset the software state (no software version change) of the system with minimal disruption in data and control traffic.

junos (Optional) Reboot from the Junos OS (main) volume.

lcc *number* —(Optional) Line-card chassis (LLC) number.

Replace *number* with the following values depending on the LCC configuration:

- 0 through 3, when T640 routers are connected to a TX Matrix router in a routing matrix.
- 0 through 3, when T1600 routers are connected to a TX Matrix Plus router in a routing matrix.
- 0 through 7, when T1600 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.
- 0, 2, 4, or 6, when T4000 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.

media (compact-flash | disk | removable-compact-flash | usb) (Optional) Use the indicated boot medium for the next boot.

media (external | internal) (Optional) Use the indicated boot medium for the next boot:

- `external`—Reboot the device using a software package stored on an external boot source, such as a USB flash drive.

- `internal`—Reboot the device using a software package stored in an internal memory source.

message "*text*" (Optional) Message to display to all system users before stopping or rebooting the software.

network (Optional) Reboot using the Preboot Execution Environment (PXE) boot method over the network.

oam (Optional) Reboot from the maintenance volume (OAM volume, usually the compact flash drive).

other-routing-engine (Optional) Reboot the other Routing Engine from which the command is issued. For example, if you issue the command from the primary Routing Engine, the backup Routing Engine is rebooted. Similarly, if you issue the command from the backup Routing Engine, the primary Routing Engine is rebooted.

partition *partition* (Optional) Reboot using the specified partition on the boot media. This option is equivalent to the `slice` option that is supported on some devices. Specify one of the following *partition* values:

- `1`—Reboot from partition 1.
- `2`—Reboot from partition 2.
- `alternate`—Reboot from the alternate partition.

scc (Optional) Reboot the Routing Engine on the TX Matrix switch-card chassis. If you issue the command from re0, re0 is rebooted. If you issue the command from re1, re1 is rebooted.

sfc *number* (Optional) Reboot the Routing Engine on the TX Matrix Plus switch-fabric chassis. If you issue the command from re0, re0 is rebooted. If you issue the command from re1, re1 is rebooted. Replace *number* with 0.

slice *slice* (Optional) Reboot using the specified partition on the boot media. This option was originally the `partitiion` option but was renamed to `slice` on EX Series and QFX Series switches. Specify one of the following *slice* values:

- `1`—Reboot from partition 1.
- `2`—Reboot from partition 2.
- `alternate`—Reboot from the alternate partition (which did not boot the switch at the last bootup).

> **NOTE**: The `slice` option is not supported on QFX Series switches that have no alternate slice when Junos OS boots as a Virtual Machine (VM). To switch to the previous version of Junos OS, issue the `request system software rollback` command.

usb (Optional) Reboot from a USB device.

The following options are available only on QFabric Systems:

all (Optional) Reboots the software on the Director group, fabric control Routing Engines, fabric manager Routing Engines, Interconnect devices, and network and server Node groups.

director-device *name* (Optional) Reboots the software on the Director device and the default partition (QFabric CLI).

director-group (Optional) Reboots the software on the Director group and the default partition (QFabric CLI).

fabric (Optional) Reboots the fabric control Routing Engines and the Interconnect devices.

node-group *name* (Optional) Reboots the software on a server Node group or a network Node group.

graceful (Optional) Enables the QFabric component to reboot with minimal impact to network traffic. This sub-option is only available for the `all`, `fabric`, and`director-group` options.

Additional Information

Reboot requests are recorded in the system log files, which you can view with the `show log` command (see *show log*). Also, the names of any running processes that are scheduled to be shut down are changed. You can view the process names with the `show system processes` command (see "show system processes" on page 313).

On a TX Matrix or TX Matrix Plus router, if you issue the `request system reboot` command on the primary Routing Engine, all the primary Routing Engines connected to the routing matrix are rebooted. If you issue this command on the backup Routing Engine, all the backup Routing Engines connected to the routing matrix are rebooted.

NOTE: Before issuing the `request system reboot` command on a TX Matrix Plus router with no options or the `all-chassis`, `all-lcc`, `lcc` *number*, or `sfc` options, verify that primary Routing Engine for all routers in the routing matrix are in the same slot number. If the primary Routing Engine for a line-card chassis is in a different slot number than the primary Routing Engine for a TX Matrix Plus router, the line-card chassis might become logically disconnected from the routing matrix after the `request system reboot` command.

NOTE: To reboot a router that has two Routing Engines, reboot the backup Routing Engine (if you have upgraded it) first, and then reboot the primary Routing Engine.

Required Privilege Level

maintenance

Output Fields

When you enter this command, you are provided feedback on the status of your request.

Sample Output

request system reboot

```
user@host> request system reboot
Reboot the system ? [yes,no] (no)
```

request system reboot (at 2300)

```
user@host> request system reboot at 2300 message ?Maintenance time!?
Reboot the system ? [yes,no] (no) yes

shutdown: [pid 186]
*** System shutdown message from root@test.example.net ***
System going down at 23:00
```

request system reboot (in 2 Hours)

The following example, which assumes that the time is 5 PM (17:00), illustrates three different ways to request the system to reboot in two hours:

```
user@host> request system reboot at +120
 user@host> request system reboot in 120
 user@host> request system reboot at 19:00
```

request system reboot (Immediately)

```
user@host> request system reboot at now
```

request system reboot (at 1:20 AM)

To reboot the system at 1:20 AM, enter the following command. Because 1:20 AM is the next day, you must specify the absolute time.

```
user@host> request system reboot at 06060120
request system reboot at 120
Reboot the system at 120? [yes,no] (no) yes
```

request system reboot in-service

```
user@switch> request system reboot in-service
Reboot the system ? [yes,no] yes
[Feb 22 02:37:04]:ISSU: Validating Image

 PRE ISSR CHECK:
 ---------------
 PFE Status                          : Online
 Member Id zero                      : Valid
 VC not in mixed or fabric mode      : Valid
 Member is single node vc            : Valid
 BFD minimum-interval check done     : Valid
```

```
 GRES enabled                          : Valid
 NSR enabled                           : Valid
 drop-all-tcp not configured           : Valid
 Ready for ISSR                        : Valid

warning: Do NOT use /user during ISSR. Changes to /user during ISSR may get lost!
Current image is jinstall-jcp-i386-flex-18.1.img
[Feb 22 02:37:14]:ISSU: Preparing Backup RE
Prepare for ISSR
[Feb 22 02:37:19]:ISSU: Backup RE Prepare Done
Spawning the backup RE
Spawn backup RE, index 1 successful
Starting secondary dataplane
Second dataplane container started
GRES in progress
Waiting for backup RE switchover ready
GRES operational
Copying home directories
Copying home directories successful
Initiating Chassis In-Service-Upgrade for ISSR
Chassis ISSU Started
[Feb 22 02:42:55]:ISSU: Preparing Daemons
[Feb 22 02:43:00]:ISSU: Daemons Ready for ISSU
[Feb 22 02:43:05]:ISSU: Starting Upgrade for FRUs
[Feb 22 02:43:15]:ISSU: FPC Warm Booting
[Feb 22 02:44:16]:ISSU: FPC Warm Booted
[Feb 22 02:44:27]:ISSU: Preparing for Switchover
[Feb 22 02:44:31]:ISSU: Ready for Switchover
Checking In-Service-Upgrade status
  Item           Status                  Reason
  FPC 0          Online (ISSU)
Send ISSR done to chassisd on backup RE
Chassis ISSU Completed
Removing dcpfe0 eth1 128.168.0.16 IP
Bringing down bme00
Post Chassis ISSU processing done
[Feb 22 02:44:33]:ISSU: IDLE
Stopping primary dataplane
Clearing ISSU states
Console and management sessions will be disconnected. Please login again.
device_handoff successful ret: 0
Shutdown NOW!
[pid 14305]
```

```
*** FINAL System shutdown message from root@sw-duckhorn-01 ***

System going down IMMEDIATELY
```

Release Information

Command introduced before Junos OS Release 7.4.

Option `other-routing-engine` introduced in Junos OS Release 8.0.

Option `sfc` introduced for the TX Matrix Plus router in Junos OS Release 9.6.

Option `partition` changed to `slice` in Junos OS Release 10.0 for EX Series switches.

Option `both-routing-engines` introduced in Junos OS Release 12.1.

Option `fast-boot` introduced in Junos OS Release 14.1X53-D10 for QFX Series.

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request system snapshot (Junos OS)

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Syntax (ACX Series Routers)

```
request system snapshot
<media type>
<partition>
```

Syntax (EX Series Switches; for EX4600, see QFX Series Syntax)

```
request system snapshot
<all-members | local | member member-id>
<media type>
<partition>
<re0 | re1 | routing-engine routing-engine-id>
<slice alternate>
```

Syntax (MX Series Routers)

```
request system snapshot
<all-members>
<config-partition>
<local>
<member member-id>
<media usb-port-number>
```

```
<partition>
<root-partition>
```

Syntax (PTX Series)

```
request system snapshot
<partition>
```

Syntax (QFX Series, OCX1100, and EX4600)

```
request system snapshot
<all-members | local | member member-id>
<config-partition>
<partition>
<root-partition>
<slice alternate>
```

Syntax (TX Matrix Routers)

```
request system snapshot
<all-chassis | all-lcc | lcc number /  scc>
<config-partition>
<partition>
<root-partition>
```

Syntax (TX Matrix Plus Routers)

```
request system snapshot
<all-chassis | all-lcc | lcc number /  sfc number>
<config-partition>
<partition>
<root-partition>
```

Description

- On routers running Junos OS, back up the currently running and active file system partitions to standby partitions that are not running. Specifically, the root file system (/) is backed up to **/altroot**, and **/config** is backed up to **/altconfig**. The root and **/config** file systems are on the router's flash drive, and the **/altroot** and **/altconfig** file systems are on the router's hard drive.
- On switches running Junos OS, take a snapshot of the files currently used to run the switch—the complete contents of the root (/) , **/altroot**, **/config**, **/var**, and **/var-tmp** directories, which include the running version of Junos OS, the active configuration, and log files.
-

System snapshot is not supported on QFX10000 and QFX5110-48s-4c switches.

Starting with Junos OS Release 15.1F3, the command `request system snapshot` creates a snapshot of the guest OS image only for the PTX5000 with RE-DUO-C2600-16G, and the MX240, MX480, and MX960 routers with RE-S-1800X4-32G-S.

Starting with Junos OS Release 15.1F5, the command `request system snapshot` creates a snapshot of the guest OS image only for the MX2010 and MX2020 routers with REMX2K-1800-32G-S.

On these routers, in order to create snapshot of the host OS image along with Junos OS image, use the `request vmhost snapshot` command.

CAUTION: After you run the `request system snapshot` command, you cannot return to the previous version of the software, because the running and backup copies of the software are identical.

Options

The specific options available depend upon the router or switch:

none Back up the currently running software as follows:

- On the router, back up the currently running and active file system partitions to standby partitions that are not running. Specifically, the root file system (/) is backed up to **/altroot**, and **/config** is backed up to **/altconfig**. The root and **/config** file systems are on the router's flash drive, and the **/altroot** and **/altconfig** file systems are on the router's hard drive.

- On the switch, take a snapshot of the files currently used to run the switch and copy them to the media that the switch did not boot from. If the switch is booted from internal media, the snapshot is copied to external (USB) media. If the switch is booted from external (USB) media, the snapshot is copied to internal media.

  - If the snapshot destination is external media but a USB flash drive is not connected, an error message is displayed.

  - If the automatic snapshot procedure is already in progress, the command returns the following error: `Snapshot already in progress. Cannot start manual snapshot.` For additional information about the automatic snapshot feature, see *Configuring Dual-Root Partitions*.

all-chassis | all-lcc | lcc *number*

(TX Matrix and TX Matrix Plus router only) (Optional)

- `all-chassis`—On a TX Matrix router, archive data and executable areas for all Routing Engines in the chassis. On a TX Matrix Plus router, archive data and executable areas for all Routing Engines in the chassis.

- `all-lcc`—On a TX Matrix router, archive data and executable areas for all T640 routers (or line-card chassis) connected to a TX Matrix router. On a TX Matrix Plus router, archive data and executable areas for all routers (or line-card chassis) connected to a TX Matrix Plus router.

- `lcc` *number*—On a TX Matrix router, archive data and executable areas for a specific T640 router (or line-card chassis) that is connected to a TX Matrix router. On a TX Matrix Plus router, archive data and executable areas for a specific router (line-card chassis) that is connected to a TX Matrix Plus router.

  Replace *number* with the following values depending on the LCC configuration:

  - 0 through 3, when T640 routers are connected to a TX Matrix router in a routing matrix.

  - 0 through 3, when T1600 routers are connected to a TX Matrix Plus router in a routing matrix.

  - 0 through 7, when T1600 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.

  - 0, 2, 4, or 6, when T4000 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.

all-members | local | member *member-id*

(EX Series Virtual Chassis, MX Series routers, QFX Series switches, QFabric System, and OCX1100 only) (Optional) Specify where to place the snapshot (archive data and executable areas) in a Virtual Chassis:

- `all-members`—Create a snapshot (archive data and executable areas) for all members of the Virtual Chassis.
- `local`—Create a snapshot (archive data and executable areas) on the member of the Virtual Chassis that you are currently logged into.
- `member` *member-id*—Create a snapshot (archive data and executable areas) for the specified member of the Virtual Chassis.

config-partition (EX Series Virtual Chassis, MX Series routers, QFX Series switches, QFabric System, OCX1100, and T and TX Series routers only) Create a snapshot of the configuration partition only and store it onto the default **/altconfig** on the hard disk device or an **/altconfig** on a USB device. Option deprecated for Junos OS with Upgraded FreeBSD in Junos OS Release 15.1.

To determine which platforms support Junos OS with upgraded FreeBSD, see Feature Explorer and enter one of the following:

- For non-virtualized, enter **freebsd** and select **Junos kernel upgrade to FreeBSD 10+**.
- For virtualized, enter **virtualization** and select **Virtualization of the Routing Engine**.

media ***type*** (ACX Series, M320, T640, and MX Series routers) (Optional) Specify the boot device the software is copied to:

- `compact-flash`—Copy software to the primary compact flash drive.
- `external`—(Switches only) Copy software to an external mass storage device, such as a USB flash drive. If a USB drive is not connected, the switch displays an error message.
- `internal`—Copy software to an internal flash drive.
- `removable-compact-flash`—Copy software to the removable compact flash drive.
- `usb`—(ACX Series, M320, T640, and, except for MX104, MX Series routers) Copy software to the device connected to the USB port.
- `usb0`—(MX104 routers only) Copy software to the device connected to the USB0 port.
- `usb1`—(MX104 routers only) Copy software to the device connected to the USB1 port.

partition (Optional) Repartition the flash drive before a snapshot occurs. If the partition table on the flash drive is corrupted, the `request system snapshot` command fails and reports errors. The partition option is only supported for restoring the software image from the hard drive to the flash drive.

(Routers only) You cannot issue the request system snapshot command when you enable flash disk mirroring. We recommend that you disable flash disk mirroring when you upgrade or downgrade the software.

(EX Series switches only) If the snapshot destination is the media that the switch did not boot from, you must use the `partition` option.

re0 | re1 | routing-engine *routing-engine-id*

(EX6200 and EX8200 switches only) Specify where to place the snapshot in a redundant Routing Engine configuration.

- `re0`—Create a snapshot on Routing Engine 0.
- `re1`—Create a snapshot on Routing Engine 1.
- `routing-engine` *routing-engine-id*—Create a snapshot on the specified Routing Engine.

root-partition

(M, MX, T, and TX Series routers; EX Series Virtual Chassis; QFX Series switches; QFabric System; and OCX1100 only) Create a snapshot of the root partition only and store it onto the default **/altroot** on the hard disk device or an **/altroot** on a USB device. Option deprecated for Junos OS with Upgraded FreeBSD in Junos OS Release 15.1.

To determine which platforms run Junos OS with Upgraded FreeBSD, see the information in Release Information for Junos OS with Upgraded FreeBSD.

slice alternate

(EX Series switches, EX Series Virtual Chassis, QFX Series switches, QFabric System, and OCX1100 only) (Optional) Take a snapshot of the active root partition and copy it to the alternate slice on the boot media.

Option deprecated for Junos OS with Upgraded FreeBSD in Junos OS Release 15.1.

To determine which platforms support Junos OS with upgraded FreeBSD, see Feature Explorer and enter one of the following:

- For non-virtualized, enter **freebsd** and select **Junos kernel upgrade to FreeBSD 10+**.
- For virtualized, enter **virtualization** and select **Virtualization of the Routing Engine**.

scc

(TX Matrix router only) (Optional) Archive data and executable areas for a TX Matrix router (or switch-card chassis).

sfc *number*

(TX Matrix Plus router only) (Optional) Archive data and executable areas for a TX Matrix Plus router (or switch-fabric chassis). Replace *number* with 0.

Additional Information

- (Routers only) Before you upgrade the software on the router, when you have a known stable system, issue the `request system snapshot` command to back up the software, including the configuration, to the **/altroot** and **/altconfig** file systems. After you have upgraded the software on the router and are satisfied that the new packages are successfully installed and running, issue the `request system snapshot` command again to back up the new software to the **/altroot** and **/altconfig** file systems.
- (Routers only) You cannot issue the `request system snapshot` command when you enable flash disk mirroring. We recommend that you disable flash disk mirroring when you upgrade or downgrade the software.
- (TX Matrix and TX Matrix Plus router only) On a routing matrix, if you issue the `request system snapshot` command on the primary Routing Engine, all the primary Routing Engines connected to the routing matrix are backed up. If you issue this command on the backup Routing Engine, all the backup Routing Engines connected to the routing matrix are backed up.

Required Privilege Level

maintenance

Output Fields

When you enter this command, you are provided feedback on the status of your request.

Sample Output

request system snapshot (Routers)

```
 user@host> request system snapshot
umount: /altroot: not currently mounted
Copying / to /altroot.. (this may take a few minutes)
umount: /altconfig: not currently mounted
Copying /config to /altconfig.. (this may take a few minutes)

The following filesystems were archived: / /config
```

request system snapshot (EX Series Switches)

```
 user@switch> request system snapshot partition
Clearing current label...
Partitioning external media (/dev/da1) ...
Partitions on snapshot:

  Partition  Mountpoint  Size    Snapshot argument
      s1a    /altroot    179M    none
      s2a    /           180M    none
      s3d    /var/tmp    361M    none
      s3e    /var        121M    none
      s4d    /config     60M     none
Copying '/dev/da0s1a' to '/dev/da1s1a' .. (this may take a few minutes)
Copying '/dev/da0s2a' to '/dev/da1s2a' .. (this may take a few minutes)
Copying '/dev/da0s3d' to '/dev/da1s3d' .. (this may take a few minutes)
Copying '/dev/da0s3e' to '/dev/da1s3e' .. (this may take a few minutes)
Copying '/dev/da0s4d' to '/dev/da1s4d' .. (this may take a few minutes)
The following filesystems were archived: /altroot / /var/tmp /var /config
```

request system snapshot partition (EX4600, QFX Series, QFabric System, and OCX1100)

```
user@switch> request system snapshot partition
Clearing current label...
Partitioning external media (da1) ...
Verifying compatibility of destination media partitions...
Running newfs (334MB) on external media  / partition ...
Running newfs (404MB) on external media  /config partition ...
Running newfs (222MB) on external media  /var partition ...
Copying '/dev/da0s2a' to '/dev/da1s1a' .. (this may take a few minutes)
Copying '/dev/da0s3e' to '/dev/da1s3e' .. (this may take a few minutes)
Copying '/dev/da0s2f' to '/dev/da1s1f' .. (this may take a few minutes)
The following filesystems were archived: / /config /var
```

request system snapshot (When the Partition Flag Is On)

```
 user@host>  request system snapshot partition
Performing preliminary partition checks ...
Partitioning ad0 ...
```

```
umount: /altroot: not currently mounted
Copying / to /altroot.. (this may take a few minutes)

The following filesystems were archived: / /config
```

request system snapshot (MX104 Routers When Media Device is Missing)

```
user@host > request system snapshot media usb0
error: usb0 media missing or invalid
```

request system snapshot (When Mirroring Is Enabled)

```
 user@host>  request system snapshot
Snapshot is not possible since mirror-flash-on-disk is configured.
```

request system snapshot all-lcc (Routing Matrix)

```
 user@host>  request system snapshot all-lcc
lcc0-re0:
--------------------------------------------------------------------------
Copying '/' to '/altroot' .. (this may take a few minutes)
Copying '/config' to '/altconfig' .. (this may take a few minutes)
The following filesystems were archived: / /config

lcc2-re0:
--------------------------------------------------------------------------
Copying '/' to '/altroot' .. (this may take a few minutes)
Copying '/config' to '/altconfig' .. (this may take a few minutes)
The following filesystems were archived: / /config
```

request system snapshot all-members (Virtual Chassis)

```
user@switch>  request system snapshot all-members media internal

fpc0:
--------------------------------------------------------------------------
```

```
Copying '/dev/da0s2a' to '/dev/da0s1a' .. (this may take a few minutes)
The following filesystems were archived: /

fpc1:
--------------------------------------------------------------------------
Copying '/dev/da0s2a' to '/dev/da0s1a' .. (this may take a few minutes)
The following filesystems were archived: /

fpc2:
--------------------------------------------------------------------------
Copying '/dev/da0s2a' to '/dev/da0s1a' .. (this may take a few minutes)
The following filesystems were archived: /

fpc3:
--------------------------------------------------------------------------
Copying '/dev/da0s2a' to '/dev/da0s1a' .. (this may take a few minutes)
The following filesystems were archived: /

fpc4:
--------------------------------------------------------------------------
Copying '/dev/da0s2a' to '/dev/da0s1a' .. (this may take a few minutes)
The following filesystems were archived: /

fpc5:
--------------------------------------------------------------------------
Copying '/dev/da0s2a' to '/dev/da0s1a' .. (this may take a few minutes)
The following filesystems were archived: /
```

Release Information

Command introduced before Junos OS Release 7.4.

Options <config-partition> and <root-partition> introduced in Junos OS Release 13.1 for M Series, MX Series, T Series, and TX Series routers.

Option media *usb-port-number* introduced in Junos OS Release 13.2 for MX104 routers.

Options <config-partition>, <root-partition>, and <slice> deprecated for Junos OS with Upgraded FreeBSD in Junos OS Release 15.1

To determine which platforms support Junos OS with upgraded FreeBSD, see Feature Explorer and enter one of the following:

- For non-virtualized, enter **freebsd** and select **Junos kernel upgrade to FreeBSD 10+**.

- For virtualized, enter **virtualization** and select **Virtualization of the Routing Engine**.

RELATED DOCUMENTATION

request system snapshot (Junos OS with Upgraded FreeBSD)

show system snapshot (Junos OS) | 343

No Link Title

request system software abort

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Syntax

```
request system software abort in-service-upgrade
```

Description

Terminate a unified in-service software upgrade (ISSU). The unified ISSU must be in progress and you must issue this command from a router session other than the one on which you issued the `request system in-service-upgrade` command that launched the unified ISSU.

Options

This command has no options.

Required Privilege Level

view

Output Fields

When you enter the `request system software abort` command on a new router session, you are provided feedback on the status of your request in the router session on which you issued the `request system software in-service-upgrade` command.

Sample Output

request system software abort (New Router Session)

```
user@host> request system software abort
```

request system software in-service-upgrade (Unified ISSU Session)

```
user@host> request system software in-service-upgrade /var/tmp/jinstall-9.0-20080117.0-domestic-
signed.tgz
ISSU: Preparing Backup RE
Pushing bundle to re1
Checking compatibility with configuration Initializing...
Using jbase-9.0-20080116.2
Verified manifest signed by PackageProduction_9_0_0 Using /var/tmp/jinstall-9.0-20080117.0-
domestic-signed.tgz
Verified jinstall-9.0-20080117.0-domestic.tgz signed by PackageProduction_9_0_0 Using
jinstall-9.0-20080117.0-domestic.tgz
Using jbundle-9.0-20080117.0-domestic.tgz
Checking jbundle requirements on /
Using jbase-9.0-20080117.0.tgz
Verified manifest signed by PackageProduction_9_0_0 Using jkernel-9.0-20080117.0.tgz Verified
manifest signed by PackageProduction_9_0_0 Using jcrypto-9.0-20080117.0.tgz Verified manifest
signed by PackageProduction_9_0_0 Using jpfe-9.0-20080117.0.tgz Using jdocs-9.0-20080117.0.tgz
Verified manifest signed by PackageProduction_9_0_0 Using jroute-9.0-20080117.0.tgz Verified
```

```
manifest signed by PackageProduction_9_0_0 Hardware Database regeneration succeeded Validating
against /config/juniper.conf.gz
mgd: commit complete
Validation succeeded
Installing package '/var/tmp/jinstall-9.0-20080117.0-domestic-signed.tgz'
...
Verified jinstall-9.0-20080117.0-domestic.tgz signed by PackageProduction_9_0_0 Adding
jinstall...
Verified manifest signed by PackageProduction_9_0_0

WARNING:     This package will load JUNOS 9.0-20080117.0 software.
WARNING:     It will save JUNOS configuration files, and SSH keys
WARNING:     (if configured), but erase all other files and information
WARNING:     stored on this machine.  It will attempt to preserve dumps
WARNING:     and log files, but this can not be guaranteed.  This is the
WARNING:     pre-installation stage and all the software is loaded when
WARNING:     you reboot the system.

Saving the config files ...
NOTICE: uncommitted changes have been saved in /var/db/config/juniper.conf.pre-install
Installing the bootstrap installer ...

WARNING:     A REBOOT IS REQUIRED TO LOAD THIS SOFTWARE CORRECTLY. Use the
WARNING:     'request system reboot' command when software installation is
WARNING:     complete. To abort the installation, do not reboot your system,
WARNING:     instead use the 'request system software delete jinstall'
WARNING:     command as soon as this operation completes.

Saving package file in
/var/sw/pkg/jinstall-9.0-20080117.0-domestic-signed.tgz ...
Saving state for rollback ...
Backup upgrade done
Rebooting Backup RE

Rebooting re1
error: ISSU Aborted! Backup RE maybe in inconsistent state, Please restore backup RE
ISSU: IDLE

{master}
user@host>
```

Release Information

Command introduced in JUNOS Release 9.0.

RELATED DOCUMENTATION

- *request system software in-service-upgrade*
- *show chassis in-service-upgrade*
- *Getting Started with Unified In-Service Software Upgrade*
- *Example: Performing a Unified ISSU*

request system software add (Junos OS)

IN THIS SECTION

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Syntax

```
request system software add package-name
<best-effort-load>
<delay-restart>
<device-alias alias-name>
<force>
<no-copy>
<no-validate>
<re0 | re1>
<reboot>
<satellite slot-id>
<set [package-name1 package-name2]>
<unlink>
<upgrade-group [all |upgrade-group-name]>
<upgrade-with-config>
<satellite slot-id>
<validate>
<version version-string>
```

Syntax (EX Series Switches)

```
request system software add package-name
<best-effort-load>
<delay-restart>
<force>
<no-copy>
<no-validate>
<re0 | re1>
<reboot>
<set [package-name1 package-name2]>
<upgrade-with-config>
<validate>
<validate-on-host hostname>
<validate-on-routing-engine routing-engine>
```

Syntax (TX Matrix Router)

```
request system software add package-name
<best-effort-load>
<delay-restart>
<force>
<lcc number | scc>
<no-copy>
<no-validate>
<re0 | re1>
<reboot>
<set [package-name1 package-name2]>
<unlink>
<upgrade-with-config>
<validate>
<validate-on-host hostname>
<validate-on-routing-engine routing-engine>
```

Syntax (TX Matrix Plus Router)

```
request system software add package-name
<best-effort-load>
<delay-restart>
<force>
<lcc number | sfc number>
<no-copy>
<no-validate>
<re0 | re1>
<reboot>
<set [package-name1 package-name2]>
<unlink>
<upgrade-with-config>
<validate>
<validate-on-host hostname>
<validate-on-routing-engine routing-engine>
```

Syntax (MX Series Router)

```
request system software add package-name
<best-effort-load>
<delay-restart>
<device-alias alias-name>
<force>
<member member-id>
<no-copy>
<no-validate>
<re0 | re1>
<reboot>
<satellite slot-id>
<set [package-name1 package-name2]>
<upgrade-group [all |upgrade-group-name]>
<unlink>
<upgrade-with-config>
<validate>
<version version-string>
<validate-on-host hostname>
<validate-on-routing-engine routing-engine>
```

Syntax (QFX Series)

```
request system software add package-name
<best-effort-load>
<component all>
<delay-restart>
<force>
<force-host>
<no-copy>
<partition>
<reboot>
<unlink>
<upgrade-with-config>
```

Syntax (OCX Series)

```
request system software add package-name
<best-effort-load>
<delay-restart>
<force>
<force-host>
<no-copy>
<no-validate>
<reboot>
<unlink>
<upgrade-with-config>
<validate>
```

Description

Install a software package or bundle on the device.

We recommend that you always download the software image to **/var/tmp** only. On EX Series and QFX Series switches, you must use the **/var/tmp** directory. Other directories are not supported.

When you are upgrading to a different release of Junos OS, you usually use the `validate` option on this command. The `validate` option checks the candidate software against the current configuration of the device to ensure they are compatible. (Validate is the default behavior when the software package being added is a different release.) However, there are circumstances under which you cannot validate the running configuration in this way. One such circumstance is when you are upgrading to Junos OS with upgraded FreeBSD from Junos OS based on FreeBSD 6.1. Another such circumstance is when you are updating between different releases of Junos OS with upgraded FreeBSD, and the newest version of FreeBSD uses system calls that are not available in earlier versions of FreeBSD.

Therefore, you cannot use the `validate` option when upgrading to Junos Release 21.2R1, because this release runs on FreeBSD 12; previous releases with upgraded FreeBSD run either FreeBSD 10 or 11.

If you are upgrading between releases that cannot use direct validation, you need to specify one of the following on the `request system software add` operational mode command when you upgrade:

- The `no-validate` option—this option does not validate the software package against the current configuration. Therefore, the current configuration might fail once you upgrade the system. Choose this option for the first time you upgrade a system to the newer version.
- The `validate-on-host` option—this option validates the software package by comparing it to the running configuration on a remote Junos OS host. Be sure to choose a host that you have already upgraded to the newer version of software.

- The `validate-on-routing-engine` option—(for systems with redundant REs) this option validates the software package by comparing it to the running configuration on a Routing Engine in the same chassis. Use this option when you have already upgraded the other Routing Engine to the newer version.

For information on valid filename and URL formats, see Format for Specifying Filenames and URLs in Junos OS CLI Commands.

Any configuration changes performed after inputting the `request system software add` command will be lost when the system reboots with an upgraded version of Junos OS.

Starting from Junos OS Release 17.2R1, PTX10008 routers do not support the `request system software add` command. Starting from Junos OS Release 17.4R1, PTX10016 routers do not support the `request system software add` command. Use the `request vmhost software add` command instead of the `request system software add` command on the PTX10008 and PTX10016 routers to install or upgrade the Junos OS software package or bundle on the router. See request vmhost software add.

When graceful Routing Engine switchover (GRES) is enabled on a device, you must perform a unified in-service software upgrade (ISSU) operation to update the software running on the device. With GRES enabled, if you attempt to perform a software upgrade by entering the `request system software add` *`package-name`* command, an error message is displayed stating that only in-service software upgrades are supported when GRES is configured. In such a case, you must either remove the GRES configuration before you attempt the upgrade or perform a unified ISSU.

Starting with Junos OS Release 15.1F3, the statement `request system software add` installs a software package for the guest OS only for the PTX5000 router with RE-DUO-C2600-16G, and for MX240, MX480, and MX960 routers with RE-S-1800X4-32G-S.

Starting with Junos OS Release 15.1F5, the statement `request system software add` installs a software package for the guest OS only for the MX2010 and MX2020 routers with REMX2K-1800-32G-S.

On these routers, in order to install both Junos software and host software packages, use the `request vmhost software add` command.

Options

package-name Location from which the software package or bundle is to be installed.

In Junos OS, *`package-name`* can be either the URL of a remote location or the pathname of a local package. But Junos OS Evolved does not support a remote iso for upgrade, so “URL” is removed from the help string in the CLI.

For example:

- **/var/tmp/*package-name***—For a software package or bundle that is being installed from a local directory on the router or switch.
- ***protocol*://*hostname*/*pathname*/*package-name***—For a software package or bundle that is to be downloaded and installed from a remote location. Replace ***protocol*** with one of the following:
  - **ftp**—File Transfer Protocol.
    Use **ftp://*hostname*/*pathname*/*package-name***. To specify authentication credentials, use **ftp://<*username*>:<*password*>@*hostname*/*pathname*/*package-name***. To have the system prompt you for the password, specify `prompt` in place of the password. If a password is required, and you do not specify the password or `prompt`, an error message is displayed.
  - **http**—Hypertext Transfer Protocol.
    Use **http://*hostname*/*pathname*/*package-name***. To specify authentication credentials, use **http://<*username*>:<*password*>@*hostname*/*pathname*/*package-name***. If a password is required and you omit it, you are prompted for it.
  - **scp**—Secure copy (not available for limited editions).
    Use **scp://*hostname*/*pathname*/*package-name***. To specify authentication credentials, use **scp://<*username*>:<*password*>@*hostname*/*pathname*/*package-name***.
- The ***pathname*** in the protocol is the relative path to the user's home directory on the remote system and not the root directory.
- Do not use the **scp** protocol in the `request system software add` command to download and install a software package or bundle from a remote location. The previous statement does not apply to the QFabric switch. The software upgrade is handled by the management process (mgd), which does not support scp.
  Use the `file copy` command to copy the software package or bundle from the remote location to the **/var/tmp** directory on the hard disk:
  file copy scp://*source*/*package-name* /var/tmp
  Then install the software package or bundle using the `request system software add` command:
  request system software add /var/tmp/*package-name*

best-effort-load (Optional) Activate a partial load and treat parsing errors as warnings instead of errors.

component all (QFabric systems only) (Optional) Install the software package on all of the QFabric components.

delay-restart (Optional) Install a software package or bundle, but do not restart software processes.

device-alias *alias-name* (Junos Fusion only) (Optional) Install the satellite software package onto the specified satellite device using the satellite device's alias name.

force (Optional) Force the addition of the software package or bundle (ignore warnings).

force-host (Optional) Force the addition of the host software package or bundle (ignore warnings) on the QFX5100 device.

lcc *number* (TX Matrix routers and TX Matrix Plus routers only) (Optional) In a routing matrix based on the TX Matrix router, install a software package or bundle on a T640 router that is connected to the TX Matrix router. In a routing matrix based on the TX Matrix Plus router, install a software package or bundle on a router that is connected to the TX Matrix Plus router.

Replace *number* with the following values depending on the LCC configuration:

- 0 through 3, when T640 routers are connected to a TX Matrix router in a routing matrix.
- 0 through 3, when T1600 routers are connected to a TX Matrix Plus router in a routing matrix.
- 0 through 7, when T1600 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.
- 0, 2, 4, or 6, when T4000 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.

member *member-id* (MX Series routers only) (Optional) Install a software package on the specified Virtual Chassis member. Replace *member-id* with a value of 0 or 1.

partition (QFX3500 switches only) (Optional) Format and repartition the media before installation.

satellite *slot-id* (Junos Fusion only) (Optional) Install the satellite software package onto the specified satellite device using the satellite devices FPC slot identifier.

scc (TX Matrix routers only) (Optional) Install a software package or bundle on a Routing Engine on a TX Matrix router (or switch-card chassis).

sfc *number*

(TX Matrix Plus routers only) (Optional) Install a software package or bundle on a Routing Engine on a TX Matrix Plus router. Replace *number* with 0.

no-copy

(Optional) Install a software package or bundle, but do not save copies of the package or bundle files.

no-validate

(Optional) When loading a software package or bundle with a different release, suppress the default behavior of the `validate` option.

To upgrade to Junos OS Release 21.2R1, you cannot use the `validate` option. Instead, choose one of the following options:

- `no-validate`
- `validate-on-host`
- `validate-on-routing-engine`

Software packages from unidentified providers cannot be loaded. To authorize providers, include the `provider-id` statement at the `[edit system extensions provider]` hierarchy level.

re0 | re1

(Optional) On routers or switches that support dual or redundant Routing Engines, load a software package or bundle on the Routing Engine in slot 0 (re0) or the Routing Engine in slot 1 (re1).

reboot

(Optional) After adding the software package or bundle, reboot the system. On a QFabric switch, the software installation is not complete until you reboot the component for which you have installed the software.

set [*package-name1package-name2*]

(Mixed EX4200 and EX4500 Virtual Chassis, M Series, MX Series, and T Series routers only) (Optional) Install multiple packages at same time:

- In the case of mixed EX4200 and EX4500 Virtual Chassis, install two software packages—a package for an EX4200 switch and the same release of the package for an EX4500 switch—to upgrade all member switches in a mixed EX4200 and EX4500 Virtual Chassis.
- In the case of M Series, MX Series, and T Series routers, install multiple (two or more) software packages and software add-on packages at the same time. The variable ***package-name*** can either be a list of installation packages, each separated by a blank space, or the full URL to the directory or tar file containing the list of installation packages.

In each case, ***installation-package*** can either be a list of installation packages, each separated by a blank space, or the full URL to the directory or tar file containing the list of installation packages.

Use the `request system software add set` command to retain any SDK configuration by installing the SDK add-on packages along with the core Junos OS installation package.

unlink

(Optional) On M Series, T Series, and MX Series routers, use the unlink option to remove the software package from this directory after a successful upgrade is completed.

upgrade-group [all |*upgrade-group-name*]

(Junos Fusion only) (Required to configure a Junos Fusion using autoconversion or manual conversion) Associate a satellite software image with a satellite software upgrade group. The satellite software package is associated with the specified satellite software upgrade group using the *upgrade-group-name*, or for all satellite software upgrade groups in a Junos Fusion when the all keyword is specified.

A satellite software upgrade group is a group of satellite devices in a Junos Fusion that are designated to upgrade to the same satellite software version using the same satellite software package. See , *Understanding Software in a Junos Fusion Provider EdgeUnderstanding Software in a Junos Fusion Enterprise*, and *Managing Satellite Software Upgrade Groups in a Junos Fusion*.

upgrade-with-config

(Optional) Install one or more configuration files.

Configuration files specified with this option must have the extension **.text** or **.xml** and have the extension specified. Using the extension **.txt** will not work.

validate

(Optional) Validate the software package or bundle against the current configuration as a prerequisite to adding the software package or bundle. This is the default behavior when the software package or bundle being added is a different release.

To upgrade to Junos OS Release 21.2R1, you cannot use the `validate` option. Instead, choose one of the following options:

- `no-validate`
- `validate-on-host`
- `validate-on-routing-engine`

The `validate` option only works on systems that do not have `graceful-switchover` (*GRES*) enabled. To use the `validate` option on a system with GRES, either disable

	GRES for the duration of the installation, or install using the command `request system software in-service-upgrade` , which requires nonstop active routing *(NSR)* to be enabled when using GRES.
validate-on-host ***hostname***	(Optional) Validate the software package by comparing it to the running configuration on a remote Junos OS host. Specify a host, replacing *hostname* with the remote hostname. You can optionally provide the username that will be used to log in to the remote host by specifying the hostname in the format `user@hostname`.
validate-on-routing-engine ***routing-engine***	(Optional) Validate the software bundle or package by comparing it to the running configuration on a Junos OS Routing Engine on the same chassis. Specify a Routing Engine, replacing *routing-engine* with the routing engine name.

Additional Information

Before upgrading the software on the router or switch, when you have a known stable system, issue the `request system snapshot` command to back up the software, including the configuration, to the **/altroot** and **/altconfig** file systems. After you have upgraded the software on the router or switch and are satisfied that the new package or bundle is successfully installed and running, issue the `request system snapshot` command again to back up the new software to the **/altroot** and **/altconfig** file systems.

The `request system snapshot` command is currently not supported on the QFabric system. Also, you cannot add or install multiple packages on a QFabric system.

After you run the `request system snapshot` command, you cannot return to the previous version of the software because the running and backup copies of the software are identical.

If you are upgrading more than one package at the same time, delete the operating system package, jkernel, last. Add the operating system package, jkernel, first and the routing software package, jroute, last. If you are upgrading all packages at once, delete and add them in the following order:

```
user@host> request system software add /var/tmp/jbase
user@host> request system software add /var/tmp/jkernel
user@host> request system software add /var/tmp/jpfe
user@host> request system software add /var/tmp/jdocs
user@host> request system software add /var/tmp/jroute
user@host> request system software add /var/tmp/jcrypto
```

By default, when you issue the `request system software add` *package-name* command on a TX Matrix primary Routing Engine, all the T640 primary Routing Engines that are connected to it are upgraded to the same version of software. If you issue the same command on the TX Matrix backup Routing Engine, all the T640 backup Routing Engines that are connected to it are upgraded to the same version of software.

Likewise, when you issue the `request system software add` *package-name* command on a TX Matrix Plus primary Routing Engine, all the T1600 or T4000 primary Routing Engines that are connected to it are upgraded to the same version of software. If you issue the same command on the TX Matrix Plus backup Routing Engine, all the T1600 or T4000 backup Routing Engines that are connected to it are upgraded to the same version of software.

Before installing software on a device that has one or more custom YANG data models added to it, back up and remove the configuration data corresponding to the custom YANG data models from the active configuration. For more information see Managing YANG Packages and Configurations During a Software Upgrade or Downgrade.

Required Privilege Level

maintenance

Output Fields

When you enter this command, you are provided feedback on the status of your request.

Sample Output

request system software add validate

```
user@host> request system software add validate /var/tmp/ jinstall-7.2R1.7-domestic-signed.tgz
Checking compatibility with configuration
Initializing...
Using jbase-7.1R2.2
Using /var/tmp/jinstall-7.2R1.7-domestic-signed.tgz
Verified jinstall-7.2R1.7-domestic.tgz signed by PackageProduction_7_2_0
Using /var/validate/tmp/jinstall-signed/jinstall-7.2R1.7-domestic.tgz
Using /var/validate/tmp/jinstall/jbundle-7.2R1.7-domestic.tgz
Checking jbundle requirements on /
Using /var/validate/tmp/jbundle/jbase-7.2R1.7.tgz
Using /var/validate/tmp/jbundle/jkernel-7.2R1.7.tgz
Using /var/validate/tmp/jbundle/jcrypto-7.2R1.7.tgz
Using /var/validate/tmp/jbundle/jpfe-7.2R1.7.tgz
Using /var/validate/tmp/jbundle/jdocs-7.2R1.7.tgz
Using /var/validate/tmp/jbundle/jroute-7.2R1.7.tgz
Validating against /config/juniper.conf.gz
mgd: commit complete
Validation succeeded
```

```
Validating against /config/rescue.conf.gz
mgd: commit complete
Validation succeeded
Installing package '/var/tmp/jinstall-7.2R1.7-domestic-signed.tgz' ...
Verified jinstall-7.2R1.7-domestic.tgz signed by PackageProduction_7_2_0
Adding jinstall...

WARNING:     This package will load JUNOS 7.2R1.7 software.
WARNING:     It will save JUNOS configuration files, and SSH keys
WARNING:     (if configured), but erase all other files and information
WARNING:     stored on this machine.  It will attempt to preserve dumps
WARNING:     and log files, but this can not be guaranteed.  This is the
WARNING:     pre-installation stage and all the software is loaded when
WARNING:     you reboot the system.

Saving the config files ...
Installing the bootstrap installer ...

WARNING:     A REBOOT IS REQUIRED TO LOAD THIS SOFTWARE CORRECTLY. Use the
WARNING:     'request system reboot' command when software installation is
WARNING:     complete. To abort the installation, do not reboot your system,
WARNING:     instead use the 'request system software delete jinstall'
WARNING:     command as soon as this operation completes.

Saving package file in /var/sw/pkg/jinstall-7.2R1.7-domestic-signed.tgz ...
Saving state for rollback ...
```

request system software add /var/tmp/ no-validate

```
user@host> request system software add no-validate /var/tmp/junos-install-mx-x86-32-15.1R1.9.tgz
Installing package '/var/tmp/junos-install-mx-x86-32-15.1R1.9.tgz' ...
Verified manifest signed by PackageProductionEc_2015
Verified manifest signed by PackageProductionRSA_2015
Verified contents.iso
Verified issu-indb.tgz
Verified junos-x86-32.tgz
Verified kernel
Verified metatags
Verified package.xml
Verified pkgtools.tgz
camcontrol: not found
```

```
camcontrol: not found
Verified manifest signed by PackageProductionEc_2015
Saving the config files ...
NOTICE: uncommitted changes have been saved in /var/db/config/juniper.conf.pre-install
Saving package file in /var/sw/pkg/junos-install-x86-32-
domestic-20150618.043753_builder_junos_151_r1.tgz ...
Saving state for rollback ...
```

request system software add no-copy no-validate reboot

```
user@host> request system software add no-copy no-validate junos-install-srx-x86-64-17.3R1.tgz
reboot
Verified junos-install-srx-x86-64-17.3R1 signed by PackageProductionEc_2017 method
ECDSA256+SHA256
Verified manifest signed by PackageProductionEc_2017 method ECDSA256+SHA256
Checking PIC combinations
Verified fips-mode signed by PackageProductionEc_2017 method ECDSA256+SHA256
Adding fips-mode-x86-32-20170728.153050_builder_junos_173_r1 ...
Verified jail-runtime signed by PackageProductionEc_2017 method ECDSA256+SHA256
Adding jail-runtime-x86-32-20170725.352915_builder_stable_10 ...
Verified jdocs signed by PackageProductionEc_2017 method ECDSA256+SHA256
Adding jdocs-x86-32-20170728.153050_builder_junos_173_r1 ...
Verified jfirmware signed by PackageProductionEc_2017 method ECDSA256+SHA256
Adding jfirmware-x86-32-17.3R1 ...
Verified jpfe-X signed by PackageProductionEc_2017 method ECDSA256+SHA256
Adding jpfe-X-x86-32-20170728.153050_builder_junos_173_r1 ...
Verified jpfe-X960 signed by PackageProductionEc_2017 method ECDSA256+SHA256
Adding jpfe-X960-x86-32-20170728.153050_builder_junos_173_r1 ...
Verified jpfe-common signed by PackageProductionEc_2017 method ECDSA256+SHA256
Adding jpfe-common-x86-32-20170728.153050_builder_junos_173_r1 ...
Verified jpfe-fips signed by PackageProductionEc_2017 method ECDSA256+SHA256
Verified jpfe-wrlinux signed by PackageProductionEc_2017 method ECDSA256+SHA256
Adding jpfe-wrlinux-x86-32-20170728.153050_builder_junos_173_r1 ...
Verified jsd-jet-1 signed by PackageProductionEc_2017 method ECDSA256+SHA256
Adding jsd-x86-32-17.3R1-jet-1 ...
```

request system software add validate-on-host

```
user@host> request system software add validate-on-host user@xyz :/var/tmp/
jinstall-15.1-20150516_ib_15_2_psd.0-domestic-signed.tgz
```

```
user@host> request system software add validate-on-host user@xyz :/var/tmp/
jinstall-15.1-20150516_ib_15_2_psd.0-domestic-signed.tgz
Extracting JUNOS version from package...
Connecting to remote host xyz...
Password:
Sending configuration to xyz...
Validating configuration on xyz...
PACKAGETYPE: not found
Checking compatibility with configuration
Initializing...
Using jbase-15.1-20150516_ib_15_2_psd.0
Verified manifest signed by PackageDevelopmentEc_2015
Using jruntime-15.1-20150516_ib_15_2_psd.0
Verified manifest signed by PackageDevelopmentEc_2015
Using jkernel-15.1-20150516_ib_15_2_psd.0
Verified manifest signed by PackageDevelopmentEc_2015
Using jroute-15.1-20150516_ib_15_2_psd.0
Verified manifest signed by PackageDevelopmentEc_2015
Using jcrypto-15.1-20150516_ib_15_2_psd.0
Verified manifest signed by PackageDevelopmentEc_2015
Using jweb-15.1-20150516_ib_15_2_psd.0
Verified manifest signed by PackageDevelopmentEc_2015
Using /var/packages/jtools-15.1-20150516_ib_15_2_psd.0
Verified manifest signed by PackageDevelopmentEc_2015
Using /var/tmp/config.tgz
Hardware Database regeneration succeeded
Validating against /config/juniper.conf.gz
mgd: warning: schema: init: 'logical-systems-vlans' contains-node 'juniper-config vlans': not
found
mgd: commit complete
Validation succeeded
Installing package '/var/tmp/jinstall-15.1-20150516_ib_15_2_psd.0-domestic-signed.tgz' ...
Verified jinstall-15.1-20150516_ib_15_2_psd.0-domestic.tgz signed by PackageDevelopmentEc_2015
Adding jinstall...

WARNING:     The software that is being installed has limited support.
WARNING:     Run 'file show /etc/notices/unsupported.txt' for details.


WARNING:     This package will load JUNOS 15.1-20150516_ib_15_2_psd.0 software.
WARNING:     It will save JUNOS configuration files, and SSH keys
WARNING:     (if configured), but erase all other files and information
WARNING:     stored on this machine.  It will attempt to preserve dumps
```

```
WARNING:     and log files, but this can not be guaranteed.  This is the
WARNING:     pre-installation stage and all the software is loaded when
WARNING:     you reboot the system.

Saving the config files ...
NOTICE: uncommitted changes have been saved in /var/db/config/juniper.conf.pre-install
Installing the bootstrap installer ...

WARNING:     A REBOOT IS REQUIRED TO LOAD THIS SOFTWARE CORRECTLY. Use the
WARNING:     'request system reboot' command when software installation is
WARNING:     complete. To abort the installation, do not reboot your system,
WARNING:     instead use the 'request system software delete jinstall'
WARNING:     command as soon as this operation completes.

Saving package file in /var/sw/pkg/jinstall-15.1-20150516_ib_15_2_psd.0-domestic-signed.tgz ...
Saving state for rollback ...
```

request system software add (Mixed EX4200 and EX4500 Virtual Chassis)

```
user@switch> request system software add set [/var/tmp/jinstall-ex-4200-11.1R1.1-domestic-
signed.tgz /var/tmp/jinstall-ex-4500-11.1R1.1-domestic-signed.tgz]
...
```

request system software add component all (QFabric Systems)

```
user@switch> request system software add /pbdata/packages/jinstall-qfabric-12.2X50-D1.3.rpm
component all
...
```

request system software add upgrade-group (Junos Fusion)

```
user@aggregation-device> request system software add /var/tmp/satellite-3.0R1.1-signed.tgz
upgrade-group group1
```

request system software add no-validate (SRX Series device)

```
user@host> request system software add /var/tmp/junos-
srxsme-20.4I-20200810_dev_common.0.0833.tgz no-copy no-validate
Formatting alternate root (/dev/ad0s2a)...
/dev/ad0s2a: 600.0MB (1228732 sectors) block size 16384, fragment size 2048
        using 4 cylinder groups of 150.00MB, 9600 blks, 19200 inodes.
super-block backups (for fsck -b #) at:
32, 307232, 614432, 921632
Installing package '/altroot/cf/packages/install-tmp/junos-20.4I-20200810_dev_common.0.0833' ...
Verified junos-boot-srxsme.tgz signed by PackageDevelopmentECP256_2020 method ECDSA256+SHA256
Verified junos-srxsme-domestic signed by PackageDevelopmentECP256_2020 method ECDSA256+SHA256
Verified manifest signed by PackageDevelopmentECP256_2020 method ECDSA256+SHA256

WARNING:     The software that is being installed has limited support.
WARNING:     Run 'file show /etc/notices/unsupported.txt' for details.

JUNOS 20.4I-20200810_dev_common.0.0833 will become active at next reboot
WARNING: A reboot is required to load this software correctly
WARNING:     Use the 'request system reboot' command
WARNING:         when software installation is complete
Saving state for rollback ...

user@host> request system software add /var/tmp/junos-srxsme-19.4R1.3.tgz no-copy no-validate
WARNING: Package junos-19.4R1.3 version 19.4R1.3 is not compatible with current loader
WARNING: Automatic recovering loader, please wait ...
Upgrading Loader...
####################################
Verifying the loader image... OK
WARNING: The new boot firmware will take effect when the system is rebooted.
WARNING: Loader recover finish.
Formatting alternate root (/dev/ad0s1a)...
/dev/ad0s1a: 598.5MB (1225692 sectors) block size 16384, fragment size 2048
     using 4 cylinder groups of 149.62MB, 9576 blks, 19200 inodes.
super-block backups (for fsck -b #) at:
32, 306464, 612896, 919328
Installing package '/altroot/cf/packages/install-tmp/junos-19.4R1.3' ...
Verified junos-boot-srxsme-19.4R1.3.tgz signed by PackageProductionEc_2019 method
ECDSA256+SHA256
Verified junos-srxsme-19.4R1.3-domestic signed by PackageProductionEc_2019 method
ECDSA256+SHA256
Verified junos-boot-srxsme-19.4R1.3.tgz signed by PackageProductionEc_2019 method
```

```
ECDSA256+SHA256 V
erified junos-srxsme-19.4R1.3-domestic signed by PackageProductionEc_2019 method ECDSA256+SHA256
JUNOS 19.4R1.3 will become active at next reboot
WARNING: A reboot is required to load this software correctly
WARNING: Use the 'request system reboot' command
WARNING: when software installation is complete Saving state for rollback ...
```

request system software add (SRX Series device)

```
user@host> request system software add /var/tmp/junos-srxsme-19.4R2.3.tgz
WARNING: Package junos-19.4R2.3 version 19.4R2.3 is not compatible with this system.
WARNING: Please install a package with veloadr support, 20.3 or higher.
```

Release Information

Command introduced before Junos OS Release 7.4.

`best-effort-load` and `unlink` options added in Junos OS Release 7.4.

`sfc` option introduced in Junos OS Release 9.6 for the TX Matrix Plus router.

`set [`*`package-name1package-name2`*`]` option added in Junos OS Release 11.1 for EX Series switches. Added in Junos OS Release 12.2 for M Series, MX Series, and T Series routers.

On EX Series switches, the `set [`*`package-name1package-name2`*`]` option allows you to install only two software packages on a mixed EX4200 and EX4500 Virtual Chassis. Whereas, on M Series, MX Series, and T Series routers, the `set [`*`package-name1package-name2package-name3`*`]` option allows you to install multiple software packages and software add-on packages at the same time.

`upgrade-with-config` and `upgrade-with-config-format` *`format`* options added in Junos OS Release 12.3 for M Series routers, MX Series routers, and T Series routers, EX Series Ethernet switches, and QFX Series devices.

`device-alias`, `satellite`, `upgrade-group`, and `version` options introduced in Junos OS Release 14.2R3 for Junos Fusion.

`validate-on-host` and `validate-on-routing-engine` options added in Junos OS Release 15.1F3 for PTX5000 routers and MX240, MX480, and MX960 routers.

`upgrade-with-config-format` *`format`* option deleted in Junos OS Release 16.1 for M Series routers, MX Series routers, and T Series routers, EX Series Ethernet switches, and QFX Series devices.

RELATED DOCUMENTATION

- Format for Specifying Filenames and URLs in Junos OS CLI Commands | 67
- *request system software rollback*
- *request system storage cleanup*
- *Installing Software Packages on QFX Series Devices (Junos OS)*
- *Upgrading Software on a QFabric System*
- *Managing Satellite Software Upgrade Groups in a Junos Fusion*
- *request system software add (Maintenance)*
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request system zeroize (Junos OS)

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Syntax

```
request system zeroize
<media>
<local>
```

Description

Use this command to remove all configuration information on the Routing Engines and reset all key values on the device where you run the command.

- If the device has dual Routing Engines, the command is broadcast to all Routing Engines on the device.
- In a Virtual Chassis or Virtual Chassis Fabric (VCF) composed of EX Series switches (except EX8200 Virtual Chassis) or QFX Series switches, this command operates only on the member switch where you run the command, even if that switch is in the primary Routing Engine role. The command is not forwarded to the backup Routing Engine member or to member switches in the line-card role. To apply this command to more than one member of an EX Series or QFX Series Virtual Chassis or VCF, we recommend you remove and disconnect each of those members from the Virtual Chassis or VCF, and then run the command on each isolated switch individually.

This command removes all data files, including customized configuration and log files, by unlinking the files from their directories. The command removes all user-created files from the system, including all plain-text passwords, secrets, and private keys for SSH, local encryption, local authentication, IPsec, RADIUS, TACACS+, and SNMP.

This command reboots the device and sets it to the factory default configuration. After the reboot, you cannot access the device through the management Ethernet interface. Log in through the console as `root` and start the Junos OS CLI by typing `cli` at the prompt.

If the configuration contains the `commit synchronize` statement at the `[edit system]` hierarchy level, and you issue a `commit` in the primary Routing Engine, the primary configuration is automatically synchronized with the backup. If the backup Routing Engine is down when you issue the `commit`, the Junos OS displays a warning and commits the candidate configuration in the primary Routing Engine. When the backup Routing Engine comes up, its configuration will automatically be synchronized with the primary. A newly inserted backup Routing Engine or a Routing Engine that comes up after running the `request system zeroize` command also automatically synchronizes its configuration with the primary Routing Engine configuration.

Starting with Junos OS Release 15.1F3, the `request system zeroize` command removes all configuration information on the guest OS for the PTX5000 router with RE-DUO-C2600-16G, and MX240, MX480, and MX960 with RE-S-1800X4-32G-S.

Starting with Junos OS Release 15.1F5, the `request system zeroize` command removes all configuration information on the guest OS for the MX2010 and MX2020 with REMX2K-1800-32G-S.

On these routers, in order to remove all configuration information on both guest OS and host OS, use the `request vmhost zeroize` command.

To completely erase user-created data so that it is unrecoverable, use the `media` option.

Options

media (Optional) In addition to removing all configuration and log files, causes memory and the media to be scrubbed, removing all traces of any user-created files. Every storage device attached to the system is scrubbed, including disks, flash drives, removable USBs, and so on. The duration of the scrubbing process is dependent on the size of the media being erased. As a result, the `request system zeroize media` operation can take considerably more time than the `request system zeroize` operation. However, the critical security parameters are all removed at the beginning of the process.

On QFX Series platforms running Junos OS Release 14.1X53 or earlier, the `media` option is not available. On QFX Series platforms running releases later than Junos OS Release 14.1X53 that do not have the upgraded FreeBSD kernel (10+), the `media` option is available, but if you use it, the system will issue a warning that the `media` option is not supported and will continue with the zeroize operation. On platforms that are not QFX Series platforms, the `media` option is not available in Junos OS Release 17.2 or later with Junos with upgraded FreeBSD.

local (Optional) Remove all the configuration information and restore all the key values on the active Routing Engine.

Specifying this option has no effect on switches in a Virtual Chassis or VCF composed of EX Series switches (except EX8200 Virtual Chassis) or QFX switches, because in these configurations, the `request system zeroize` command only operates locally by default.

Required Privilege Level

maintenance

Sample Output

request system zeroize

```
user@host> request system zeroize
warning: System will be rebooted and may not boot without configuration
Erase all data, including configuration and log files? [yes,no] (no) yes


0 1 1 0 0 0 done

syncing disks... All buffers synced.
Uptime: 5d19h20m26s
```

```
recorded reboot as normal shutdown
Rebooting...

U-Boot 1.1.6 (Mar 11 2011 - 04:39:06)

Board: EX4200-24T 2.11
EPLD:  Version 6.0 (0x85)
DRAM:  Initializing (1024 MB)
FLASH: 8 MB

Firmware Version: --- 01.00.00 ---
USB:   scanning bus for devices... 2 USB Device(s) found
       scanning bus for storage devices... 1 Storage Device(s) found

ELF file is 32 bit
Consoles: U-Boot console

FreeBSD/PowerPC U-Boot bootstrap loader, Revision 2.4
(user@device.example.net, Fri Mar 11 03:03:36 UTC 2011)
Memory: 1024MB
bootsequencing is enabled
bootsuccess is set
new boot device = disk0s1:
Loading /boot/defaults/loader.conf
/kernel data=0x915c84+0xa1260 syms=[0x4+0x7cbd0+0x4+0xb1c19]


Hit [Enter] to boot immediately, or space bar for command prompt.
Booting [/kernel]...
Kernel entry at 0x800000e0 ...
GDB: no debug ports present
KDB: debugger backends: ddb
KDB: current backend: ddb
Copyright (c) 1996-2011, Juniper Networks, Inc.
All rights reserved.
Copyright (c) 1992-2006 The FreeBSD Project.
Copyright (c) 1979, 1980, 1983, 1986, 1988, 1989, 1991, 1992, 1993, 1994
        The Regents of the University of California. All rights reserved.
JUNOS 11.1R1.8 #0: 2011-03-09 20:14:25 UTC
    user@device.example.net:/volume/build/junos/11.1/release/11.1R1.8/obj-powerpc/bsd/kernels/
        JUNIPER-EX/kernel
Timecounter "decrementer" frequency 50000000 Hz quality 0
cpu0: Freescale e500v2 core revision 2.2
```

```
cpu0: HID0 80004080
...
```

Release Information

Command introduced before Junos OS Release 9.0.

Option `media` added in Junos OS Release 11.4 for EX Series switches.

Option `local` added in Junos OS Release 14.1.

RELATED DOCUMENTATION

request system snapshot (Junos OS) | **209**

Reverting to the Default Factory Configuration for the EX Series Switch

Reverting to the Rescue Configuration for the EX Series Switch

Reverting to the Default Factory Configuration

Reverting to the Rescue Configuration

Reverting to the Default Factory Configuration by Using the request system zeroize Command

show chassis hardware

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Syntax

```
show chassis hardware
<detail | extensive>
<clei-models>
<models>
```

Syntax (EX Series Devices, MX104, MX204, MX2010, MX2020, MX10003, MX10008, and MX2008 Universal Routing Platforms)

```
show chassis hardware
<clei-models>
<detail | extensive>
<models>
<satellite [slot-id slot-id |device-alias  alias-name]>
```

Syntax (TX Matrix Router)

```
show chassis hardware
<clei-models>
<detail | extensive>
<models>
<lcc number /  scc>
```

Syntax (TX Matrix Plus Router)

```
show chassis hardware
<clei-models>
<detail | extensive>
<models>
<lcc number |  sfc number>
```

Syntax (MX Series Devices)

```
show chassis hardware
<detail | extensive>
<clei-models>
<models>
<all-members>
<local>
<member member-id>
```

Syntax (QFX Series)

```
show chassis hardware
<detail | extensive>
<clei-models>
<interconnect-device name>
<node-device name>
<models>
```

Description

Display a list of all Flexible PIC Concentrators (FPCs) and PICs installed in the router or switch chassis, including the hardware version level and serial number.

In the EX Series switch command output, FPC refers to the following:

- On EX2200 switches, EX3200 switches, EX4200 standalone switches, and EX4500 switches—Refers to the switch; FPC *number* is always 0.
- On EX4200 switches in a Virtual Chassis configuration—Refers to the member of a Virtual Chassis; FPC *number* equals the member ID, from 0 through 9.

- On EX8208 and EX8216 switches—Refers to a line card; FPC *number* equals the slot number for the line card.

On QFX3500, QFX5100, and OCX Series standalone switches, and PTX1000 devices both the FPC and FPC *number* are always `0`.

On T4000 Type 5 FPCs, there are no `top temperature sensor` or `bottom temperature sensor` parameters. Instead, `fan intake temperature sensor` and `fan exhaust temperature sensors` parameters are displayed.

Starting from Junos OS Release 11.4, the output of the `show chassis hardware models` operational mode command displays the enhanced midplanes FRU model numbers (CHAS-BP3-MX240-S, CHAS-BP3-MX480-S or CHAS-BP3-MX960-S) based on the router. Prior to release 11.4, the FRU model numbers are left blank when the router has enhanced midplanes. Note that the enhanced midplanes are introduced through the Junos OS Release 13.3, but can be supported on all Junos OS releases.

Starting with Junos OS Release 14.1, the output of the `show chassis hardware detail | extensive | clei-models | models` operational mode command displays the new DC power supply module (PSM) and power distribution unit (PDU) that are added to provide power to the high-density FPC (FPC2-PTX-P1A) and other components in a PTX5000 Packet Transport Router.

Options

none — Display information about hardware. For a TX Matrix router, display information about the TX Matrix router and its attached T640 devices. For a TX Matrix Plus router, display information about the TX Matrix Plus router and its attached devices.

clei-models — (Optional) Display Common Language Equipment Identifier (CLEI) barcode and model number for orderable field-replaceable units (FRUs).

detail — (Optional) Include RAM and disk information in output.

extensive — (Optional) Display ID EEPROM information.

all-members — (MX Series devices only) (Optional) Display hardware-specific information for all the members of the Virtual Chassis configuration.

interconnect-device *name* — (QFabric systems only) (Optional) Display hardware-specific information for the Interconnect device.

lcc *number* — (TX Matrix devices and TX Matrix Plus router only) (Optional) On a TX Matrix router, display hardware information for a specified T640 router (line-card chassis) that is connected to the TX Matrix router. On a TX Matrix Plus router, display hardware information for a specified router (line-card chassis) that is connected to the TX Matrix Plus router.

Replace *number* with the following values depending on the LCC configuration:

- 0 through 3, when T640 devices are connected to a TX Matrix router in a routing matrix.
- 0 through 3, when T1600 devices are connected to a TX Matrix Plus router in a routing matrix.
- 0 through 7, when T1600 devices are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.
- 0, 2, 4, or 6, when T4000 devices are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.

local — (MX Series devices only) (Optional) Display hardware-specific information for the local Virtual Chassis members.

member *member-id* — (MX Series devices and EX Series switches) (Optional) Display hardware-specific information for the specified member of the Virtual Chassis configuration. Replace *member-id* variable with a value 0 or 1.

models — (Optional) Display model numbers and part numbers for orderable FRUs and, for components that use ID EEPROM format v2, the CLEI code.

node-device *name* — (QFabric systems only) (Optional) Display hardware-specific information for the Node device.

satellite [slot-id *slot-id* | device-alias *alias-name*] — (Junos Fusion only) (Optional) Display hardware information for the specified satellite device in a Junos Fusion, or for all satellite devices in the Junos Fusion if no satellite devices are specified.

scc — (TX Matrix router only) (Optional) Display hardware information for the TX Matrix router (switch-card chassis).

sfc *number* — (TX Matrix Plus router only) (Optional) Display hardware information for the TX Matrix Plus router (switch-fabric chassis). Replace *number* variable with `0`.

Additional Information

The `show chassis hardware detail` command now displays DIMM information for the following Routing Engines, as shown in Table 5 on page 250.

Table 5: Routing Engines Displaying DIMM Information

Routing Engines	Devices
RE-S-1800x2 and RE-S-1800x4	MX240, MX480, and MX960 devices
RE-A-1800x2	M120 and M320 devices

In Junos OS Release 11.4 and later, the output for the `show chassis hardware models` operational mode command for MX Series devices display the enhanced midplanes FRU model numbers—CHAS-BP3-MX240-S, CHAS-BP3-MX480-S, or CHAS-BP3-MX960-S—based on the router. In releases before Junos OS Release 11.4, the FRU model numbers are left blank when the router has enhanced midplanes. Note that the enhanced midplanes are introduced through Junos OS Release 13.3, but can be supported on all Junos OS releases.

Starting with Junos OS Release 17.3R1, the output of the `show chassis hardware` command displays the mode in which vMX is running (performance mode or lite mode) in the part number field for the FPC. `RIOT-PERF` indicates performance mode and `RIOT-LITE` indicates lite mode.

Starting with Junos OS Release 22.2R1, the RE-S-X6-128G-K Routing Engine (RE) is supported for MX240, MX480, and MX960 devices. View the details of the RE in the command output.

Required Privilege Level

view

Output Fields

Table 6 on page 250 lists the output fields for the `show chassis hardware` command. Output fields are listed in the approximate order in which they appear.

Table 6: show chassis hardware Output Fields

Field Name	Field Description	Level of Output
`Item`	Show information about the device hardware.	All levels
`Version`	Revision level of the chassis component.	All levels
`Part number`	Part number of the chassis component.	All levels

Table 6: show chassis hardware Output Fields *(Continued)*

Field Name	Field Description	Level of Output
`Serial number`	Serial number of the chassis component. The serial number of the backplane is also the serial number of the router chassis. Use this serial number when you need to contact Juniper Networks Customer Support about the router or switch chassis.	All levels
`Assb ID` or `Assembly ID`	(`extensive` keyword only) Identification number that describes the FRU hardware.	`extensive`
`Assembly Version`	(`extensive` keyword only) Version number of the FRU hardware.	`extensive`
`Assembly Flags`	(`extensive` keyword only) Flags.	`extensive`
`FRU model number`	(`clei-models`, `extensive`, and `models` keyword only) Model number of the FRU hardware component.	none specified
`CLEI code`	(`clei-models` and `extensive` keyword only) Common Language Equipment Identifier code. This value is displayed only for hardware components that use ID EEPROM format v2. This value is not displayed for components that use ID EEPROM format v1.	none specified
`EEPROM Version`	ID EEPROM version used by the hardware component: `0x00` (version 0), `0x01` (version 1), or `0x02` (version 2).	`extensive`

Table 6: show chassis hardware Output Fields *(Continued)*

Field Name	Field Description	Level of Output
`Description`	Brief description of the hardware item: • Type of power supply. • Type of PIC. If the PIC type is not supported on the current software release, the output states `Hardware Not Supported`. • Type of FPC: `FPC Type 1`, `FPC Type 2`, `FPC Type 3`, `FPC Type 4` , or `FPC TypeOC192`. On EX Series switches, a brief description of the FPC. The following list shows the PIM abbreviation in the output and the corresponding PIM name. • `2x FE`—Either two built-in Fast Ethernet interfaces (fixed PIM) or dual-port Fast Ethernet PIM • `4x FE`—4-port Fast Ethernet ePIM • `1x GE Copper`—Copper Gigabit Ethernet ePIM (one 10-Mbps, 100-Mbps, or 1000-Mbps port) • `1x GE SFP`—SFP Gigabit Ethernet ePIM (one fiber port) • `2x Serial`—Dual-port serial PIM • `2x T1`—Dual-port T1 PIM • `2x E1`—Dual-port E1 PIM • `2x CT1E1`—Dual-port channelized T1/E1 PIM • `1x T3`—T3 PIM (one port) • `1x E3`—E3 PIM (one port) • `4x BRI S/T`—4-port ISDN BRI S/T PIM • `4x BRI U`—4-port ISDN BRI U PIM • `1x ADSL Annex A`—ADSL 2/2+ Annex A PIM (one port, for POTS)	All levels

Table 6: show chassis hardware Output Fields *(Continued)*

Field Name	Field Description	Level of Output
	• 1x ADSL Annex B—ADSL 2/2+ Annex B PIM (one port, for ISDN) • 2x SHDSL (ATM)—G SHDSL PIM (2-port two-wire module or 1-port four-wire module) • 1x TGM550—TGM550 Telephony Gateway Module (Avaya VoIP gateway module with one console port, two analog LINE ports, and two analog TRUNK ports) • 1x DS1 TIM510—TIM510 E1/T1 Telephony Interface Module (Avaya VoIP media module with one E1 or T1 trunk termination port and ISDN PRI backup) • 4x FXS, 4xFX0, TIM514—TIM514 Analog Telephony Interface Module (Avaya VoIP media module with four analog LINE ports and four analog TRUNK ports) • 4x BRI TIM521—TIM521 BRI Telephony Interface Module (Avaya VoIP media module with four ISDN BRI ports) • Crypto Accelerator Module—For enhanced performance of cryptographic algorithms used in IP Security (IPsec) services • MPC M 16x 10GE—16-port 10-Gigabit Module Port Concentrator that supports SFP+ optical transceivers. (Not on EX Series switches.) • For hosts, the Routing Engine type. • For small form-factor pluggable transceiver (SFP) modules, the type of fiber: LX, SX, LH, or T. • LCD description for EX Series switches (except EX2200 switches). • MPC2—1-port MPC2 that supports two separate slots for MICs. • MPC3E—1-port MPC3E that supports two separate slots for MICs (MIC-3D-1X100GE-CFP and MIC-3D-20GE-SFP) on MX960, MX480, and MX240 devices. The MPC3E maps one MIC to one PIC (1 MIC, 1 PIC), which differs from the mapping of legacy MPCs. • 100GBASE-LR4, pluggable CFP optics	

Table 6: show chassis hardware Output Fields *(Continued)*

Field Name	Field Description	Level of Output
	• Supports the Enhanced MX Switch Control Board with fabric redundancy and existing SCBs without fabric redundancy. • Interoperates with existing MX Series line cards, including Flexible Port Concentrators (FPC), Dense Port Concentrators (DPCs), and Modular Port Concentrators (MPCs). • MPC4E—Fixed configuration MPC4E that is available in two flavors: MPC4E-3D-32XGE-SFPP and MPC4E-3D-2CGE-8XGE on MX2020, MX960, MX480, and MX240 devices. • LCD description for MX Series devices	

Sample Output

show chassis hardware (MX240, MX480, MX960 Devices)

```
user@host> show chassis hardware

Hardware inventory:
Item             Version  Part number  Serial number     Description
Chassis                                JN1230686AFB      MX480
Midplane         REV 05   710-017414   ACRB7717          MX480 Midplane
FPM Board        REV 02   710-017254   CADF2017          Front Panel Display
PEM 0            Rev 03   740-022697   QCS1142C0HJ       PS 1.2-1.7kW; 100-240V AC in
PEM 1            Rev 01   740-022697   QCS1035C0CM       PS 1.2-1.7kW; 100-240V AC in
Routing Engine 0 REV 06   711-145342   CASE0160          RE-S-X6-128G-K
CB 0             REV 05   750-055976   CAES7891          Enhanced MX SCB 2
CB 1             REV 12   750-062572   CALM3310          Enhanced MX SCB 2
Fan Tray                                                 Enhanced Left Fan Tray
```

show chassis hardware (MX10008 Router)

```
user@host> show chassis hardware
```

```
Hardware inventory:
Item             Version  Part number  Serial number     Description
Chassis                                DE538             JNP10008 [MX10008]
Midplane         REV 27   750-054097   ACPD6954          Midplane 8
Routing Engine 0          BUILTIN      BUILTIN           RE X10
Routing Engine 1          BUILTIN      BUILTIN           RE X10 128
CB 0             REV 10   750-079562   CAKF2158          Control Board
CB 1             REV 05   711-065897   CAJG2680          Control Board
FPC 1            REV 04   750-084779   CAKN5706          JNP10K-LC2101
  CPU            REV 05   750-073391   CAKJ2864          LC 2101 PMB
  PIC 0                   BUILTIN      BUILTIN           4xQSFP28 SYNCE
    Xcvr 0       REV 01   740-046565   XXL0BQM           QSFP+-40G-SR4
    Xcvr 1       REV 01   740-032986   QB350242          QSFP+-40G-SR4
    Xcvr 2       REV 01   740-054053   QE408285          QSFP+-4X10G-SR
    Xcvr 3       REV 01   740-046565   QF3300Z9          QSFP+-40G-SR4
  PIC 1                   BUILTIN      BUILTIN           4xQSFP28 SYNCE
    Xcvr 0       REV 01   740-067442   QJ2200LD          QSFP+-40G-SR4
    Xcvr 1       REV 01   740-038153   APF170500382DP    QSFP+-40G-CU3M
    Xcvr 2       REV 01   740-067442   QI4302LC          QSFP+-40G-SR4
  PIC 2                   BUILTIN      BUILTIN           4xQSFP28 SYNCE
    Xcvr 0       REV 01   740-067442   1ACP1335119       QSFP+-40G-SR4
    Xcvr 1       REV 01   740-067442   1ACP1313156       QSFP+-40G-SR4
    Xcvr 2       REV 01   740-067442   QK050040          QSFP+-40G-SR4
    Xcvr 3       REV 01   740-067442   QJ2201BG          QSFP+-40G-SR4
  PIC 3                   BUILTIN      BUILTIN           4xQSFP28 SYNCE
    Xcvr 0       REV 01   740-058734   1ECQ12400CS       QSFP-100GBASE-SR4
    Xcvr 1       REV 01   740-046565   QF3300ZX          QSFP+-40G-SR4
    Xcvr 2       REV 01   740-061405   1ECQ12510FH       QSFP-100G-SR4-T2
    Xcvr 3       REV 01   740-032986   QB491182          QSFP+-40G-SR4
  PIC 4                   BUILTIN      BUILTIN           4xQSFP28 SYNCE
    Xcvr 0       REV 01   740-067442   QJ2200D5          QSFP+-40G-SR4
    Xcvr 1       REV 01   740-054053   XXS0L95           QSFP+-4X10G-SR
  PIC 5                   BUILTIN      BUILTIN           4xQSFP28 SYNCE
    Xcvr 0       REV 01   740-054053   QE251550          QSFP+-4X10G-SR
    Xcvr 1       REV 01   740-054053   XZB01D5           QSFP+-4X10G-SR
    Xcvr 3       REV 01   740-046565   QI1402F9          QSFP+-40G-SR4
FPD Board        REV 07   711-054687   ACPF2896          Front Panel Display
PEM 1            REV 02   740-049388   1EDL62102PR       Power Supply AC
PEM 2            REV 02   740-049388   1EDL60300H2       Power Supply AC
PEM 4            REV 02   740-049388   1EDL603003Z       Power Supply AC
PEM 5            REV 01   740-049388   1EDL339001B       Power Supply AC
FTC 0            REV 14   750-050108   ACNW3344          Fan Controller 8
FTC 1            REV 14   750-050108   ACPE3978          Fan Controller 8
```

```
Fan Tray 0       REV 09   760-054372   ACNV5507          Fan Tray 8
Fan Tray 1       REV 09   760-054372   ACNV5371          Fan Tray 8
SFB 0            REV 25   750-050058   ACPH6821          Switch Fabric (SIB) 8
SFB 1
SFB 2            REV 24   750-050058   ACNZ0641          Switch Fabric (SIB) 8
SFB 3            REV 27   750-050058   ACPH9127          Switch Fabric (SIB) 8
SFB 5            REV 24   750-050058   ACNX7396          Switch Fabric (SIB) 8
```

show chassis hardware (PTX10008 Router)

```
root@host> show chassis hardware
Hardware inventory:
Item             Version  Part number  Serial number     Description
Chassis                                DK404             JNP10008 [PTX10008]
Midplane         REV 28   750-054097   ACPP2394          Midplane 8
Routing Engine 0          BUILTIN      BUILTIN           RE-PTX-2X00x4
Routing Engine 1          BUILTIN      BUILTIN           RE-PTX-2X00x4
CB 0             REV 04   750-068820   ACPT5303          Control Board
CB 1             REV 04   750-068820   ACPR1627          Control Board
FPC 6            REV 13   750-068822   ACPB2753          LC1102 - 12C / 36Q /
14                                                                                  4X
  CPU                     BUILTIN      BUILTIN           FPC CPU
  PIC 0                   BUILTIN      BUILTIN           12x100GE/36x40GE/
144x10                                                                                 GE
    Xcvr 0       REV 01   740-067442   XV304N6           QSFP+-40G-SR4
    Xcvr 1       REV 01   740-067442   XV30A5M           QSFP+-40G-SR4
    Xcvr 2       REV 01   740-067442   XV300HC           QSFP+-40G-SR4
    Xcvr 3       REV 01   740-067443   XU20L17           QSFP+-40G-SR4
    Xcvr 4       REV 01   740-067442   XV303XG           QSFP+-40G-SR4
    Xcvr 5       REV 01   740-067443   XV306QC           QSFP+-40G-SR4
    Xcvr 6       REV 01   740-067442   XV303Y7           QSFP+-40G-SR4
    Xcvr 7       REV 01   740-067443   XX60DMR           QSFP+-40G-SR4
    Xcvr 9       REV 01   740-067443   XX60DNY           QSFP+-40G-SR4
    Xcvr 10      REV 01   740-054053   QF4605WF          QSFP+-4X10G-SR
    Xcvr 13      REV 01   740-058734   1ECQ115007D       QSFP-100GBASE-SR4
    Xcvr 15      REV 01   740-046565   QH06035R          QSFP+-40G-SR4
    Xcvr 16      REV 01   740-046565   QH0602KC          QSFP+-40G-SR4
    Xcvr 17      REV 01   740-046565   QH0507PA          QSFP+-40G-SR4
    Xcvr 18      REV 01   740-046565   QH06035M          QSFP+-40G-SR4
    Xcvr 24      REV 01   740-046565   QH0507QL          QSFP+-40G-SR4
    Xcvr 25      REV 01   740-067443   XV20CWP           QSFP+-40G-SR4
```

```
    Xcvr 34      REV 01   740-046565   QH06035U          QSFP+-40G-SR4
    Xcvr 35      REV 01   740-067443   XX60DN9           QSFP+-40G-SR4
FPC 7            REV 41   750-051357   ACPL3446          LC1101 - 30C / 30Q / 96X
  CPU                     BUILTIN      BUILTIN           FPC CPU
  PIC 0                   BUILTIN      BUILTIN           30x100GE/30x40GE/96x10GE
    Xcvr 0       REV 01   740-067443   XX60DPC           QSFP+-40G-SR4
    Xcvr 1       REV 01   740-054053   QF4605W7          QSFP+-4X10G-SR
    Xcvr 2       REV 01   740-067443   XX60DP8           QSFP+-40G-SR4
    Xcvr 3       REV 01   740-067442   XV30FYM           QSFP+-40G-SR4
    Xcvr 4       REV 01   740-067442   1ACP133406Z       QSFP+-40G-SR4
    Xcvr 5       REV 01   740-067443   XX60DP5           QSFP+-40G-SR4
    Xcvr 8       REV 01   740-046565   QH060355          QSFP+-40G-SR4
    Xcvr 12      REV 01   740-058734   1ECQ115008C       QSFP-100GBASE-SR4
    Xcvr 15      REV 01   740-046565   QH0602KG          QSFP+-40G-SR4
    Xcvr 16      REV 01   740-046565   QH0602LG          QSFP+-40G-SR4
    Xcvr 17      REV 01   740-046565   QH06035S          QSFP+-40G-SR4
    Xcvr 18      REV 01   740-046565   QH0602KS          QSFP+-40G-SR4
    Xcvr 24      REV 01   740-067443   QI2902DP          QSFP+-40G-SR4
Power Supply 2   REV 02   740-049388   1EDL70200NP       Power Supply AC
Power Supply 3   REV 02   740-049388   1EDL603005C       Power Supply AC
Power Supply 4   REV 02   740-049388   1EDL70200P1       Power Supply AC
Power Supply 5   REV 02   740-049388   1EDL70200B7       Power Supply AC
FTC 0            REV 16   750-050108   ACPK8682          Fan Controller 8
FTC 1            REV 16   750-050108   ACPR9530          Fan Controller 8
Fan Tray 0       REV 10   760-054372   ACPR9509          Fan Tray 8
Fan Tray 1       REV 10   760-054372   ACPV7260          Fan Tray 8
SIB 1            REV 28   750-050058   ACPV6306          Switch Fabric 8
SIB 2            REV 28                ACPR2569          Switch Fabric 8
SIB 3            REV 28   750-05       ACPW7402          Switch Fabric 8
SIB 4            REV 28   750-050058   ACPR2577          Switch Fabric 8
FPD Board        REV 07   711-054687   ACPM4965          Front Panel Display
```

show chassis hardware (PTX10016 Router Junos OS Evolved Release)

```
user@host> show chassis hardware
Hardware inventory:
Item             Version  Part number  Serial number     Description
Chassis                                DY814             JNP10016 [PTX10016]
Midplane 0       REV 02   750-085608   BCAW3258          Midplane 16
FPM 0            REV 01   711-086964   BCAR0775          Front Panel Display
PSM 0            Rev 03   740-069994   1F269200046       JNP10K 5500W AC/HVDC Power Supply Unit
```

```
PSM 1            Rev 03   740-069994   1F269170144       JNP10K 5500W AC/HVDC Power Supply Unit
PSM 2            REV 02   740-049388   1EDL60300C6      JNP10K 5500W AC/HVDC Power Supply Unit
PSM 3            REV 02   740-049388   1EDL603005X      JNP10K 5500W AC/HVDC Power Supply Unit
PSM 4            REV 02   740-049388   1EDL6170275      JNP10K 5500W AC/HVDC Power Supply Unit
PSM 5            REV 02   740-049388   1EDL61701WD      JNP10K 5500W AC/HVDC Power Supply Unit
Routing Engine 0          BUILTIN      BUILTIN           JNP10K-RE1-E
CB 0             REV 15   750-079562   BCAW3941          Control Board
Routing Engine 1          BUILTIN      BUILTIN           JNP10K-RE1-E
CB 1             REV 15   750-079562   BCAW3942          Control Board
FPC 0            REV 07   750-093524   BCAY8271          JNP10K-LC1201
CPU              REV 14   710-001726   HM1084            FPC CPU
FPC 10           REV 07   750-093524   BCAY8277          JNP10K-LC1201CPU              REV 05
710-010169   HZ3219            FPC CPU-Enhanced
SIB 0            REV 02   750-083426   BCAV7680          SIB-JNP10016
SIB 1            REV 02   750-083426   BCAV7682          SIB-JNP10016
SIB 2            REV 02   750-083426   BCAV7681          SIB-JNP10016
SIB 3            REV 02   750-083426   BCAV7684          SIB-JNP10016
SIB 4            REV 02   750-083426   BCAV7683          SIB-JNP10016
SIB 5            REV 02   750-083426   BCAV7685          SIB-JNP10016
FTC 0            REV 10   750-086270   BCAV0609          Fan Controller 16
Fan Tray 0       REV 02   750-103311   BCAY1793          Fan Tray 16
Fan Tray 1       REV 02   750-103311   BCAY1797          Fan Tray 16
```

show chassis hardware clei-models (PTX10016 Router)

```
user@host> show chassis hardware clei-models
Hardware inventory:
Item             Version  Part number  CLEI code         FRU model number
Midplane         REV 24   750-077138   CMMUN00ARA        JNP10016
CB 0             REV 04   711-065897   PROTOXCLEI        PROTO-ASSEMBLY
CB 1             REV 05   711-065897   PROTOXCLEI        PROTO-ASSEMBLY
FPC 2
  PIC 0                   BUILTIN
FPC 4            REV 35   750-071976   CMUIANABAA        JNP10K-LC1101
  PIC 0                   BUILTIN
FPC 5            REV 13   750-068822   CMUIAM9BAC        QFX10000-36Q
  PIC 0                   BUILTIN
FPC 6            REV 41   750-071976   CMUIANABAB        JNP10K-LC1101
  PIC 0                   BUILTIN
FPC 7            REV 35   750-071976   CMUIANABAA        JNP10K-LC1101
  PIC 0                   BUILTIN
```

```
FPC 8            REV 35   750-071976   CMUIANABAA        JNP10K-LC1101
  PIC 0                   BUILTIN
FPC 9            REV 41   750-071976   CMUIANABAB        JNP10K-LC1101
  PIC 0                   BUILTIN
FPC 10           REV 35   750-071976   CMUIANABAA        JNP10K-LC1101
  PIC 0                   BUILTIN
FPC 11           REV 35   750-071976   CMUIANABAA        JNP10K-LC1101
  PIC 0                   BUILTIN
FPC 13           REV 41   750-071976   CMUIANABAB        JNP10K-LC1101
  PIC 0                   BUILTIN
FPC 15           REV 37   750-071976   CMUIANABAA        JNP10K-LC1101
  PIC 0                   BUILTIN
Power Supply 0   REV 01   740-073147   CMUPADPBAA        JNP10K-PWR-DC
Power Supply 1   REV 01   740-073147   CMUPADPBAA        JNP10K-PWR-DC
Power Supply 2   REV 01   740-073147   CMUPADPBAA        JNP10K-PWR-DC
Power Supply 3   REV 01   740-073147   CMUPADPBAA        JNP10K-PWR-DC
Power Supply 4   REV 01   740-073147   CMUPADPBAA        JNP10K-PWR-DC
Power Supply 5   REV 01   740-073147   CMUPADPBAA        JNP10K-PWR-DC
Power Supply 6   REV 01   740-073147   CMUPADPBAA        JNP10K-PWR-DC
Power Supply 7   REV 01   740-073147   CMUPADPBAA        JNP10K-PWR-DC
Power Supply 8   REV 01   740-073147   CMUPADPBAA        JNP10K-PWR-DC
Power Supply 9   REV 01   740-073147   CMUPADPBAA        JNP10K-PWR-DC
Fan Tray 0                                             QFX5100-FAN-AFO
Fan Tray 1                                             QFX5100-FAN-AFO
SIB 0            REV 15   750-077140   CMUCAH6CAA        JNP10016-SF
SIB 1            REV 15   750-077140   CMUCAH6CAA        JNP10016-SF
SIB 2            REV 15   750-077140   CMUCAH6CAA        JNP10016-SF
SIB 3            REV 15   750-077140   CMUCAH6CAA        JNP10016-SF
SIB 4            REV 15   750-077140   CMUCAH6CAA        JNP10016-SF
SIB 5            REV 15   750-077140   CMUCAH6CAA        JNP10016-SF
FPD Board        REV 07   711-054687
```

show chassis hardware (QFX5700 Router)

```
user@host> show chassis hardware
Hardware inventory:
Item               Version        Part number   Serial number   Description
Chassis                           EC819         JNP5700         [QFX5700]
…..
…..
…..
Routing Engine 0                  BUILTIN       BUILTIN         JNP5700-RCB
```

```
Routing Engine 1                  BUILTIN       BUILTIN         JNP5700-RCB
CB 0               REV 15         750-079562    BCAV5526        Control Board
CB 1               REV 15         750-079562    BCAW0403        Control Board
```

show chassis hardware (SRX5800 Router)

```
user@host> show chassis hardware
show chassis hardware
Hardware inventory:
Item             Version  Part number  Serial number     Description
Chassis                                JN1080B50AFA      MX960
Midplane         REV 02   710-013698   CC6226            MX960 Backplane
Fan Extender     REV 02   710-018051   JY5235            Extended Cable Manager
FPM Board        REV 01   710-014974   JS4207            Front Panel Display
PEM 0            Rev 01   740-080280   1F238510008       MX960-UNIVERSAL-HV-PSM
PEM 1            Rev 01   740-080280   1F238510030       MX960-UNIVERSAL-HV-PSM
PEM 2            Rev 01   740-080280   1F238510023       MX960-UNIVERSAL-HV-PSM
PEM 3            Rev 01   740-080280   1F238510047       MX960-UNIVERSAL-HV-PSM
```

show chassis hardware detail (EX9251 Switch)

```
user@switch> show chassis hardware
Hardware inventory:
Item             Version  Part number  Serial number     Description
Chassis                                BLANK             EX9251
Routing Engine 0          BUILTIN      BUILTIN           RE-S-2X00x6
CB 0             REV 05   750-069579   CAGT1382          EX9251
FPC 0                     BUILTIN      BUILTIN           MPC
  PIC 0                   BUILTIN      BUILTIN           4XQSFP28 PIC
    Xcvr 0       REV 01   740-044512   APF14500007NHC    QSFP+-40G-CU50CM
    Xcvr 2       REV 01   740-046565   QH21035H          QSFP+-40G-SR4
  PIC 1                   BUILTIN      BUILTIN           8XSFPP PIC
    Xcvr 0       REV 01   740-031980   AA15393URH7       SFP+-10G-SR
    Xcvr 1       REV 01   740-031980   AA162832LVG       SFP+-10G-SR
    Xcvr 2       REV 01   740-031980   MXA0NKJ           SFP+-10G-SR
    Xcvr 3       REV 01   740-031980   MXA0K75           SFP+-10G-SR
    Xcvr 4       REV 01   740-021308   MXA138L           SFP+-10G-SR
    Xcvr 5       REV 01   740-021308   13T511102684      SFP+-10G-SR
```

```
    Xcvr 6       REV 01   740-021308   MXA138E          SFP+-10G-SR
    Xcvr 7       REV 01   740-021308   MXA152N          SFP+-10G-SR
PEM 0            REV 02   740-070749   1F186390060      AC AFO 650W PSU
PEM 1            REV 02   740-070749   1F186390045      AC AFO 650W PSU
Fan Tray 0                                             Fan Tray, Front to Back Airflow - AFO
Fan Tray 1                                             Fan Tray, Front to Back Airflow - AFO
```

show chassis hardware extensive (T640 Router)

```
user@host> show chassis hardware extensive
Hardware inventory:
Item             Version  Part number  Serial number     Description
Chassis                                                  T640
 Jedec Code:   0x7fb0            EEPROM Version:    0x01
 P/N:        ...........       S/N:             ...........
 Assembly ID:  0x0507            Assembly Version:  00.00
 Date:         00-00-0000        Assembly Flags:    0x00
 Version:    ...........
 ID: Gibson LCC Chassis
 Board Information Record:
  Address 0x00: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
 I2C Hex Data:
  Address 0x00: 7f b0 01 ff 05 07 00 00 00 00 00 00 00 00 00 00
  Address 0x10: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  Address 0x20: ff ff ff ff ff ff ff ff ff ff ff ff 00 00 00 00
  Address 0x30: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  Address 0x40: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
Midplane         REV 04   710-002726   AX5633
 Jedec Code:   0x7fb0            EEPROM Version:    0x01
 P/N:          710-002726.       S/N:               AX5633.
 Assembly ID:  0x0127            Assembly Version:  01.04
 Date:         06-27-2001        Assembly Flags:    0x00
 Version:      REV 04.....
 ID: Gibson Backplane
 Board Information Record:
  Address 0x00: ad 01 08 00 00 90 69 0e f8 00 ff ff ff ff ff ff
 I2C Hex Data:
  Address 0x00: 7f b0 01 ff 01 27 01 04 52 45 56 20 30 34 00 00
  Address 0x10: 00 00 00 00 37 31 30 2d 30 30 32 37 32 36 00 00
  Address 0x20: 53 2f 4e 20 41 58 35 36 33 33 00 00 00 1b 06 07
  Address 0x30: d1 ff ff ff ad 01 08 00 00 90 69 0e f8 00 ff ff
```

```
  Address 0x40: ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
FPM GBUS         REV 02   710-002901   HE3245
 ...
FPM Display      REV 02   710-002897   HA4873
 ...
CIP              REV 05   710-002895   HA4729
...
PEM 1            RevX02   740-002595   MD21815          Power Entry Module
 ...
SCG 0            REV 04   710-003423   HF6023
 ...
SCG 1            REV 04   710-003423   HF6061
 ...
Routing Engine 0 REV 01   740-005022   210865700292     RE-3.0
...
CB 0             REV 06   710-002728   HE3614
...
FPC 1            REV 01   710-002385   HE3009           FPC Type 1
...              REV 06   710-001726   HC0010
```

show chassis hardware interconnect-device (QFabric Systems)

```
user@switch> show chassis hardware interconnect-device interconnect1
Hardware inventory:
Item             Version  Part number  Serial number     Description
Chassis          REV 07                                  QFX_olive
Midplane         REV 07   750-021261   BH0208188289      QFX Midplane
CB 0             REV 07   750-021261   BH0208188289      QFXIC08-CB4S
```

show chassis hardware lcc (TX Matrix Router)

```
user@host> show chassis hardware lcc 0
lcc0-re0:
--------------------------------------------------------------------------
Hardware inventory:
Item             Version  Part number  Serial number     Description
Chassis                                65751             T640
Midplane         REV 03   710-005608   RA1408            T640 Backplane
FPM GBUS         REV 09   710-002901   RA2784            T640 FPM Board
FPM Display      REV 05   710-002897   RA2825            FPM Display
```

```
CIP               REV 06   710-002895   HT0684           T Series CIP
PEM 0             Rev 11   740-002595   PM18483          Power Entry Module
PEM 1             Rev 11   740-002595   qb13984          Power Entry Module
SCG 0             REV 11   710-003423   HT0022           T640 Sonet Clock Gen.
Routing Engine 0  REV 13   740-005022   210865700363     RE-3.0 (RE-600)
CB 0              REV 03   710-007655   HW1195           Control Board (CB-T)
FPC 1             REV 05   710-007527   HM3245           FPC Type 2
  CPU             REV 14   710-001726   HM1084           FPC CPU
  PIC 0           REV 02   750-007218   AZ1112           2x OC-12 ATM2 IQ, SMIR
  PIC 1           REV 02   750-007745   HG3462           4x OC-3 SONET, SMIR
  PIC 2           REV 14   750-001901   BA5390           4x OC-12 SONET, SMIR
  PIC 3           REV 09   750-008155   HS3012           2x G/E IQ, 1000 BASE
    SFP 0                  NON-JNPR     P1186TY          SFP-S
    SFP 1         REV 01   740-007326   P11WLTF          SFP-SX
  MMB 1           REV 02   710-005555   HL7514           MMB-288mbit
  PPB 0           REV 04   710-003758   HM4405           PPB Type 2
  PPB 1           REV 04   710-003758   AV1960           PPB Type 2
FPC 2             REV 08   710-010154   HZ3578           E-FPC Type 3
  CPU             REV 05   710-010169   HZ3219           FPC CPU-Enhanced
  PIC 0           REV 02   750-009567   HX2882           1x 10GE(LAN),XENPAK
    SFP 0         REV 01   740-009898   USC202U709       XENPAK-LR
  PIC 1           REV 03   750-003336   HJ9954           4x OC-48 SONET, SMSR
  PIC 2           REV 01   750-004535   HC0235           1x OC-192 SM SR1
  PIC 3           REV 07   750-007141   HX1699           10x 1GE(LAN), 1000 BASE
    SFP 0         REV 01   740-007326   2441042          SFP-SX
    SFP 1         REV 01   740-007326   2441027          SFP-SX
  MMB 0           REV 03   710-010171   HV2365           MMB-5M3-288mbit
  MMB 1           REV 03   710-010171   HZ3888           MMB-5M3-288mbit
SPMB 0            REV 09   710-003229   HW5245           T Series Switch CPU
SIB 3             REV 07   710-005781   HR5927           SIB-L8-F16
  B Board         REV 06   710-005782   HR5971           SIB-L8-F16 (B)
SIB 4             REV 07   710-005781   HR5903           SIB-L8-F16
  B Board         REV 06   710-005782   HZ5275           SIB-L8-F16 (B)
```

show chassis hardware models (MX2010 Router)

```
user@host > show chassis hardware models
Hardware inventory:
Item              Version  Part number  Serial number     FRU model number
FPM Board         REV 06   711-032349   ZX8744           711-032349
PSM 4             REV 0C   740-033727   VK00254          00000000000000000000
```

```
PSM 5            REV 0B   740-033727   VG00015          00000000000000000000
PSM 6            REV 0B   740-033727   VH00097          00000000000000000000
PSM 7            REV 0C   740-033727   VJ00151          00000000000000000000
PSM 8            REV 0C   740-033727   VJ00149          00000000000000000000
PDM 0            REV 0B   740-038109   WA00008
PDM 1            REV 0B   740-038109   WA00014
Routing Engine 0 REV 02   740-041821   9009094134       RE-S-1800X4-16G-S
Routing Engine 1 REV 02   740-041821   9009094141       RE-S-1800X4-16G-S
CB 0             REV 08   750-040257   CAAB3491         750-040257
CB 1             REV 08   750-040257   CAAB3489         750-040257
SFB 0            REV 06   711-032385   ZV1828           711-032385
SFB 1            REV 07   711-032385   ZZ2568           711-032385
SFB 2            REV 07   711-032385   ZZ2563           711-032385
SFB 3            REV 07   711-032385   ZZ2564           711-032385
SFB 4            REV 07   711-032385   ZZ2580           711-032385
SFB 5            REV 07   711-032385   ZZ2579           711-0323856
SFB 6            REV 07   711-032385   CAAB4882         711-044170
SFB 7            REV 07   711-032385   CAAB4898         711-044170
FPC 0            REV 33   750-028467   CAAB1919         MPC-3D-16XGE-SFPP
FPC 1            REV 21   750-033205   ZG5027           MX-MPC3-3D
  MIC 0          REV 03   750-033307   ZV6299           MIC3-3D-10XGE-SFPP
  MIC 1          REV 03   750-033307   ZV6268           MIC3-3D-10XGE-SFPP
FPC 8            REV 22   750-031089   ZT9746           MX-MPC2-3D
  MIC 0          REV 26   750-028392   ABBS1150         MIC-3D-20GE-SFP
  MIC 1          REV 26   750-028387   ABBR9582         MIC-3D-4XGE-XFP
FPC 9            REV 11   750-036284   ZL3591           MPCE-3D-16XGE-SFPP
ADC 0            REV 05   750-043596   CAAC2073         750-043596
ADC 1            REV 01   750-043596   ZV4117           750-043596
ADC 8            REV 01   750-043596   ZV4107           750-043596
ADC 9            REV 02   750-043596   ZW1555           750-043596
Fan Tray 0       REV 2A   760-046960   ACAY0015
Fan Tray 1       REV 2A   760-046960   ACAY0019
Fan Tray 2       REV 2A   760-046960   ACAY0020
Fan Tray 3       REV 2A   760-046960   ACAY0021
```

show chassis hardware node-device (QFabric Systems)

```
user@switch> show chassis hardware node-device node1
Routing Engine 0   BUILTIN      BUILTIN           QFX Routing Engine
node1              REV 05   711-032234   ED3694            QFX3500-48S4Q-AFI
```

```
  CPU                   BUILTIN      BUILTIN          FPC CPU
  PIC 0                 BUILTIN      BUILTIN          48x 10G-SFP+
    Xcvr 8       REV 01   740-030658   AD0946A028B      SFP+-10G-USR
```

show chassis hardware scc (TX Matrix Router)

```
user@host> show chassis hardware scc
scc-re0:
--------------------------------------------------------------------------
Hardware inventory:
Item             Version  Part number  Serial number     Description
Chassis                                                  TX Matrix
Midplane         REV 04   710-004396   RB0014            SCC Midplane
FPM GBUS         REV 04   710-004617   HW9141            SCC FPM Board
FPM Display      REV 04   710-004619   HS5950            SCC FPM
CIP 0            REV 01   710-010218   HV9151            SCC CIP
CIP 1            REV 01   710-010218   HV9152            SCC CIP
PEM 1            Rev 11   740-002595   QB13977           Power Entry Module
Routing Engine 0 REV 05   740-008883   P11123900153      RE-4.0 (RE-1600)
CB 0             REV 01   710-011709   HR5964            Control Board (CB-TX)
SPMB 0           REV 09   710-003229   HW5293            T Series Switch CPU
SIB 3
SIB 4            REV 01   710-005839   HW1177            SIB-S8-F16
  B Board        REV 01   710-005840   HW1202            SIB-S8-F16 (B)
```

show chassis hardware sfc (TX Matrix Plus Router)

```
user@host> show chassis hardware sfc 0
sfc0-re0:
--------------------------------------------------------------------------
Hardware inventory:
Item             Version  Part number  Serial number     Description
Chassis                                JN112F007AHB      TXP
Midplane         REV 05   710-022574   TS4027            SFC Midplane
FPM Display      REV 03   710-024027   DX0282            TXP FPM Display
CIP 0            REV 04   710-023792   DW4889            TXP CIP
CIP 1            REV 04   710-023792   DW4887            TXP CIP
PEM 0            Rev 07   740-027463   UM26368           Power Entry Module
Routing Engine 0 REV 01   740-026942   737A-1064         SFC RE
Routing Engine 1 REV 01   740-026942   737A-1082         SFC RE
```

```
CB 0            REV 09   710-022606   DW6099           SFC Control Board
CB 1            REV 09   710-022606   DW6096           SFC Control Board
SPMB 0                   BUILTIN                       SFC Switch CPU
SPMB 1                   BUILTIN                       SFC Switch CPU
SIB F13 0       REV 04   710-022600   DX0841           F13 SIB
  B Board       REV 03   710-023431   DX0966           F13 SIB Mezz
SIB F13 1       REV 04   750-024564   DW5776           F13 SIB
  B Board       REV 03   710-023431   DW9028           F13 SIB
SIB F13 3       REV 04   750-024564   DW5762           F13 SIB
  B Board       REV 03   710-023431   DW9059           F13 SIB
SIB F13 4       REV 04   750-024564   DW5797           F13 SIB
  B Board       REV 03   710-023431   DW9041           F13 SIB
SIB F13 6       REV 04   750-024564   DW5770           F13 SIB
  B Board       REV 03   710-023431   DW9079           F13 SIB Mezz
SIB F13 7       REV 04   750-024564   DW5758           F13 SIB
  B Board       REV 03   710-023431   DW9047           F13 SIB
SIB F13 8       REV 04   750-024564   DW5761           F13 SIB
  B Board       REV 03   710-023431   DW9043           F13 SIB Mezz
SIB F13 9       REV 04   750-024564   DW5754           F13 SIB
  B Board       REV 03   710-023431   DW9078           F13 SIB Mezz
SIB F13 11      REV 04   710-022600   DX0826           F13 SIB
  B Board       REV 03   710-023431   DX0967           F13 SIB Mezz
SIB F13 12      REV 04   750-024564   DW5794           F13 SIB
  B Board       REV 03   710-023431   DW9044           F13 SIB Mezz
SIB F2S 0/0     REV 05   710-022603   DW7897           F2S SIB
  B Board       REV 05   710-023787   DW7657           NEO PMB
SIB F2S 0/2     REV 05   710-022603   DW7833           F2S SIB
  B Board       REV 05   710-023787   DW7526           NEO PMB
SIB F2S 0/4     REV 05   710-022603   DW7875           F2S SIB
  B Board       REV 05   710-023787   DW7588           NEO PMB
SIB F2S 0/6     REV 05   710-022603   DW7860           F2S SIB
  B Board       REV 05   710-023787   DW7589           NEO PMB
SIB F2S 1/0     REV 04   710-022603   DW4820           F2S SIB
  B Board       REV 05   710-023787   DW8510           NEO PMB
SIB F2S 1/2     REV 05   710-022603   DW7849           F2S SIB
  B Board       REV 05   710-023787   DW7525           NEO PMB
SIB F2S 1/4     REV 05   710-022603   DW7927           F2S SIB
  B Board       REV 05   710-023787   DW7556           F2S SIB Mezz
SIB F2S 1/6     REV 05   710-022603   DW7866           F2S SIB
  B Board       REV 05   710-023787   DW7651           NEO PMB
SIB F2S 2/0     REV 05   710-022603   DW7880           F2S SIB
  B Board       REV 05   710-023787   DW7523           NEO PMB
SIB F2S 2/2     REV 05   710-022603   DW7895           F2S SIB
```

```
  B Board         REV 05   710-023787   DW7591            NEO PMB
SIB F2S 2/4       REV 05   710-022603   DW7907            F2S SIB
  B Board         REV 05   710-023787   DW7590            NEO PMB
SIB F2S 2/6       REV 05   710-022603   DW7785            F2S SIB
  B Board         REV 05   710-023787   DW7524            NEO PMB
SIB F2S 3/0       REV 05   710-022603   DW7782            F2S SIB
  B Board         REV 05   710-023787   DW7634            NEO PMB
SIB F2S 3/2       REV 05   710-022603   DW7793            F2S SIB
  B Board         REV 05   710-023787   DW7548            NEO PMB
SIB F2S 3/4       REV 05   710-022603   DW7779            F2S SIB
  B Board         REV 05   710-023787   DW7587            NEO PMB
SIB F2S 3/6       REV 05   710-022603   DW7930            F2S SIB
  B Board         REV 05   710-023787   DW7505            NEO PMB
SIB F2S 4/0       REV 05   710-022603   DW7867            F2S SIB
  B Board         REV 05   710-023787   DW7656            NEO PMB
SIB F2S 4/2       REV 05   710-022603   DW7917            F2S SIB
  B Board         REV 05   710-023787   DW7640            NEO PMB
SIB F2S 4/4       REV 05   710-022603   DW7929            F2S SIB
  B Board         REV 05   710-023787   DW7643            NEO PMB
SIB F2S 4/6       REV 05   710-022603   DW7870            F2S SIB
  B Board         REV 05   710-023787   DW7635            NEO PMB
Fan Tray 0        REV 06   760-024497   DV7831            Front Fan Tray
Fan Tray 1        REV 06   760-024497   DV9614            Front Fan Tray
Fan Tray 2        REV 06   760-024502   DV9618            Rear Fan Tray
Fan Tray 3        REV 06   760-024502   DV9616            Rear Fan Tray
Fan Tray 4        REV 06   760-024502   DV7807            Rear Fan Tray
Fan Tray 5        REV 06   760-024502   DV7828            Rear Fan Tray
```

show chassis hardware (ACX7100-48L)

```
user@host> show chassis hardware
Hardware inventory:
Item             Version  Part number  Serial number     Description
Chassis                                YW0220320039      JNP7100-48L
[ACX7100-48
  L]
PSM 1            REV 04   740-085431   1ED79520221       PSU 1600W AC, Front
to                                                                          Back
Airflow
Routing Engine 0 REV 04   611-112446   YY0220320013      RE-JNP-7100
CB 0             REV 05   650-113149   YW0220320039      Control Board
```

```
FPC 0                   BUILTIN      BUILTIN          ACX7100-48L
  PIC 0                 BUILTIN      BUILTIN          MRATE- 48xSFP56 +
6xQSF                                                                    P56-
DD
    Xcvr 0       REV 01   740-068639   1A1M31A311008    SFP28-25G-BASE-SR
    Xcvr 1       REV 01   740-030658   AA1230AZYWW      SFP+-10G-USR
    Xcvr 2       REV 01   740-031980   AP42G0C          SFP+-10G-SR
    Xcvr 3       REV 01   740-031980   ARN2FS9          SFP+-10G-SR
    Xcvr 4       REV 01   740-031980   AP4150P          SFP+-10G-SR
    Xcvr 5       REV 01   740-031980   123363A01134     SFP+-10G-SR
    Xcvr 6       REV 01   740-031980   B11E02539        SFP+-10G-SR
    Xcvr 7       REV 01   740-031980   ARQ0WRX          SFP+-10G-SR
    Xcvr 12      REV 01   740-031980   193363A00707     SFP+-10G-SR
    Xcvr 15      REV 01   740-031980   AMS15RT          SFP+-10G-SR
    Xcvr 18      REV 01   740-068639   1A1M31A5370MX    SFP28-25G-BASE-SR
    Xcvr 19      REV 01   740-068639   1A1M31A5370MS    SFP28-25G-BASE-SR
    Xcvr 21      REV 01   740-068639   1A1M31A5370MW    SFP28-25G-BASE-SR
    Xcvr 22      REV 01   740-068639   1A1M31A5370MT    SFP28-25G-BASE-SR
    Xcvr 43      REV 01   740-031980   CH09KN1H4        SFP+-10G-SR
    Xcvr 44      REV 01   740-031980   AMB0TC1          SFP+-10G-SR
    Xcvr 46      REV 01   740-031980   AP40WQN          SFP+-10G-SR
    Xcvr 47      REV 01   740-031980   APR1BCS          SFP+-10G-SR
    Xcvr 48      REV 01   740-054053   XXH0KH1          QSFP+-4X10G-SR
    Xcvr 49      REV 01   740-058734   1ECQ144605L      QSFP-100GBASE-SR4
    Xcvr 50      REV 01   740-054053   XWP0Q7D          QSFP+-4X10G-SR
    Xcvr 51      REV 01   740-058734   1ECQ144604H      QSFP-100GBASE-SR4
    Xcvr 52      REV 01   740-054053   XXH0KGC          QSFP+-4X10G-SR
    Xcvr 53      REV 01   740-058734   1ECQ144605K      QSFP-100GBASE-SR4
Fan Tray 0                                            JNP7100 Fan Tray,
Front                                                                    to
Back Airflow - AFO
Fan Tray 1                                            JNP7100 Fan Tray,
Front                                                                    to
Back Airflow - AFO
Fan Tray 2                                            JNP7100 Fan Tray,
Front                                                                    to
Back Airflow - AFO
Fan Tray 3                                            JNP7100 Fan Tray,
Front                                                                    to
Back Airflow - AFO
Fan Tray 4                                            JNP7100 Fan Tray,
Front                                                                    to
Back Airflow - AFO
```

```
Fan Tray 5                                                JNP7100 Fan Tray,
Front                                                                                to
Back Airflow - AFO
```

show chassis hardware (MX204)

The `show chassis hardware` command output does not include information about the fan tray serial number and part number of MX204 routers. This does not affect the fan's functionality.

```
user@host> show chassis hardware
Hardware inventory:Item             Version  Part number  Serial number     Description
Chassis                                 CV190             JNP204 [MX204]
Routing Engine 0          BUILTIN      BUILTIN           RE-S-1600x8
CB 0             REV 40   750-069579   CARN0542          JNP204 [MX204]
FPC 0                     BUILTIN      BUILTIN           MPC
  PIC 0                   BUILTIN      BUILTIN           4XQSFP28 PIC
    Xcvr 0       REV 01   740-067443   1ACP16161C7       QSFP+-40G-SR4
    Xcvr 1       REV 01   740-067443   1ACP16161E7       QSFP+-40G-SR4
    Xcvr 2       REV 01   740-067443   1ACP16161DV       QSFP+-40G-SR4
    Xcvr 3       REV 01   740-099582   1A1CQ1B6350DC     QSFP-100GBASE-SR4
  PIC 1                   BUILTIN      BUILTIN           8XSFPP PIC
    Xcvr 0       REV 01   740-031980   AJJ036G           SFP+-10G-SR
    Xcvr 1       REV 01   740-031980   AN20CP8           SFP+-10G-SR
PEM 1            REV 04   740-043886   1GA4A380672       JPSU-650W-DC-AFO
Fan Tray 0                                              Fan Tray, Front to Back Airflow - AFO
Fan Tray 1                                              Fan Tray, Front to Back Airflow - AFO
Fan Tray 2                                              Fan Tray, Front to Back Airflow -
AFO                                                                                  to
Back Airflow - AFO
```

show chassis hardware (SRX5800)

```
user@host> show chassis hardware

Hardware inventory:
Item             Version  Part number  Serial number     Description
Chassis                                JN1080B50AFA      MX960
Midplane         REV 02   710-013698   CC6226            MX960 Backplane
Fan Extender     REV 02   710-018051   JY5235            Extended Cable Manager
FPM Board        REV 01   710-014974   JS4207            Front Panel Display
```

```
PEM 0            Rev 01   740-080280   1F238510008       SRX5800-UNIVERSAL-HV-PSM
PEM 1            Rev 01   740-080280   1F238510030       SRX5800-UNIVERSAL-HV-PSM
PEM 2            Rev 01   740-080280   1F238510023       SRX5800-UNIVERSAL-HV-PSM
PEM 3            Rev 01   740-080280   1F238510047       SRX5800-UNIVERSAL-HV-PSM
```

show chassis hardware (PTX10001-36MR) (400G ZR and 400G ZR-M optics)

```
user@host show chassis hardware
Hardware inventory:
    Item             Version  Part number  Serial number     Description
    Chassis                                EM436             JNP10001-36MR [PTX10001-36MR]
    PSM 0            REV 07   740-073765   1GE29391099       AC AFO 3000W PSU
    Routing Engine 0 REV 08   750-100243   BCBH4788          RE-JNP10001-36MR
    CB 0             REV 16   750-099260   BCBJ1424          Control Board
    FPC 0                     BUILTIN      BUILTIN           FPC-JNP10001-36MR
      PIC 0                   BUILTIN      BUILTIN           8X400GE-MR + 4X100GE-MR
        Xcvr 0       REV 01   740-032986   ECX40K80042       QSFP+-40G-SR4
        Xcvr 2       REV 01   740-032986   QF4804ZM          QSFP+-40G-SR4
        Xcvr 3       REV 01   740-046565   QD190447          QSFP+-40G-SR4
        Xcvr 4       REV 01   740-038624   S1810376855-1     QSFP+-40G-CU3M
        Xcvr 5       REV 01   740-032986   ECX40K80028       QSFP+-40G-SR4
        Xcvr 10      REV 01   740-131169   1T1TZFA70500D     QSFP56-DD-400G-ZR-M
      PIC 1                   BUILTIN      BUILTIN           8X400GE-MR + 4X100GE-MR
        Xcvr 0       REV 01   740-032986   XV303SF           QSFP+-40G-SR4
        Xcvr 1       REV 01   740-067442   QI1202B5          QSFP+-40G-SR4
        Xcvr 2       XXXX     NON-JNPR     204053396         QSFP56-DD-400G-ZR
        Xcvr 4       REV 01   740-061405   1ECQ13150KE       QSFP-100GBASE-SR4-T2
        Xcvr 10      REV 01   740-131169   1T1TZFA70500C     QSFP56-DD-400G-ZR-M
      PIC 2                   BUILTIN      BUILTIN           8X400GE-MR + 4X100GE-MR
        Xcvr 0       REV 01   740-032986   QD481959          QSFP+-40G-SR4
        Xcvr 1       REV 01   740-038624   C1909242760-1     QSFP+-40G-CU3M
        Xcvr 3       REV 01   740-032986   ECX02IC0146       QSFP+-40G-SR4
        Xcvr 4       REV 01   740-065631   1ACS12510R3       QSFP28-100G-AOC-3M
        Xcvr 5       REV 01   740-065631   1ACS1251023       QSFP28-100G-AOC-3M
        Xcvr 9       REV 01   740-061405   1ECQ13150A5       QSFP-100GBASE-SR4-T2
        Xcvr 10      XXXX     NON-JNPR     204053387         QSFP56-DD-400G-ZR
        Xcvr 11      REV 01   740-038623   MOC14256230865    QSFP+-40G-CU1M
    SIB 0                     BUILTIN      BUILTIN           SIB-JNP10001-36MR
    Fan Tray 0                                               JNP10001 Fan Tray, Front to Back
Airflow - AFO
    Fan Tray 1                                               JNP10001 Fan Tray, Front to Back
```

```
Airflow - AFO
    Fan Tray 2                                              JNP10001 Fan Tray, Front to Back
Airflow - AFO
    Fan Tray 3                                              JNP10001 Fan Tray, Front to Back
Airflow - AFO
    Fan Tray 4                                              JNP10001 Fan Tray, Front to Back
Airflow - AFO
    Fan Tray 5                                              JNP10001 Fan Tray, Front to Back
Airflow - AFO
```

show chassis hardware (MX304)

```
user@host show chassis hardware
Hardware inventory:
Item             Version  Part number  Serial number     Description
Chassis                                EU591             JNP304 [MX304]
Routing Engine 0 REV 01   750-123749   BCBZ3334          RE 2400 8C 128G
Routing Engine 1 REV 06   750-123749   BCCE2842          RE 2400 8C 128G
CB 0             REV 01   750-123404   BCBY2022          Control Board
FPC 0                     BUILTIN      BUILTIN           FPC-BUILTIN
  CPU            REV 01   750-122877   BCBX9348          JNP304 PMB
  PIC 0          REV 04   750-122718   BCBY7928          MRATE LMIC 16x100G/4x400G
    Xcvr 0       REV 01   740-065632   1FCS251700J       QSFP28-100G-AOC-5M
    Xcvr 3       REV 01   740-058734   1ACQ113404W       QSFP-100GBASE-SR4
    Xcvr 4       REV01    740-061002   LEO15180024       QSFP28-100G-CU5M
    Xcvr 5       REV 01   740-061405   1ECQ15200A9       QSFP-100G-SR4-T2
    Xcvr 7       REV 01   740-061405   1ECQ151819K       QSFP-100G-SR4-T2
    Xcvr 8       REV 01   740-058734   1ACQ11470MW       QSFP-100GBASE-SR4
    Xcvr 12      REV 01   740-065630   1FCS044402M       QSFP28-100G-AOC-1M
  PIC 1          REV 04   750-122718   BCBY7930          MRATE LMIC 16x100G/4x400G
    Xcvr 0       REV 01   740-090165   1W1CSAA539002     QSFP56-DD-400G-AOC-3M
    Xcvr 4       REV 01   740-067443   1ACP16161CQ       QSFP+-40G-SR4
    Xcvr 12      REV 01   740-065632   1FCS2517005       QSFP28-100G-AOC-5M
    Xcvr 14      REV 01   740-061405   1F1CQ1A5201F7     QSFP-100G-SR4-T2
PEM 0            Rev 01   740-110419   1F27B040062       AC AFO 2200W Power Supply
PEM 1
Fan Tray 0       REV 02   760-126744   BCCB3869          JNP304 Fan Tray, Front to Back Airflow
Fan Tray 1       REV 02   760-126744   BCCB3870          JNP304 Fan Tray, Front to Back Airflow
Fan Tray 2       REV 01   760-126744   BCBY4493          JNP304 Fan Tray, Front to Back Airflow
```

```
SFB 0            REV 01   750-122847   BCBX1427          Switch Fabric Board
TIB              REV 01   750-126514   BCBX9919          Timing Interface Board
```

show chassis hardware (ACX7509-FPC-20Y)

```
user@host show chassis hardware
Hardware inventory:
Item             Version  Part number  Serial number     Description
FPC 5            REV 04   750-120787   CARH7889          JNP-FPC-20Y
  PIC 0                   BUILTIN      BUILTIN           20x1/10/25/50-SFP56
    Xcvr 0       REV 01   740-071562   1A1M3AA5480F8     SFP28-25G-BASE-LR
    Xcvr 1       REV 01   720-120775   1P1C54A628HVN     SFP56-50G-DAC-3M
    Xcvr 2       REV 01   720-120775   1P1C54A629JCQ     SFP56-50G-DAC-3M
    Xcvr 5       REV 01   740-031980   A55B20R           SFP+-10G-SR
    Xcvr 6       REV 01   720-120775   1P1C54A629JCS     SFP56-50G-DAC-3M
    Xcvr 7       REV 01   720-120775   1P1C54A628HWR     SFP56-50G-DAC-3M
    Xcvr 8       REV 01   740-068639   1A1M31A31105D     SFP28-25G-BASE-SR
    Xcvr 9       REV 01   740-068639   1A1M31A31105A     SFP28-25G-BASE-SR
    Xcvr 10      REV 01   720-120775   1P1C54A628HZR     SFP56-50G-DAC-3M
    Xcvr 11      REV 01   720-120775   1P1C54A628J00     SFP56-50G-DAC-3M
    Xcvr 12      REV 01   720-120775   1P1C54A628HW4     SFP56-50G-DAC-3M
    Xcvr 16      REV 01   740-031980   MXA0NHJ           SFP+-10G-SR
    Xcvr 17      REV 01   740-031980   AP41HCV           SFP+-10G-SR
    Xcvr 18      REV 01   740-031980   A54BA6S           SFP+-10G-SR
    Xcvr 19      REV 01   740-031980   AP40WRE           SFP+-10G-SR
```

Release Information

Command introduced before Junos OS Release 7.4.

`models` option introduced in Junos OS Release 8.2.

`sfc` option introduced in Junos OS Release 9.6 for the TX Matrix Plus router.

Information for `disk` and `usb` introduced in Junos OS Release 15.1X53-D60 for QFX10002, QFX10008, and QFX10016 switches.

`pem` detail output added in Junos OS Release 21.4R1 for SRX5800.

NOTE: Devices and routing platforms use the basic syntax, unless otherwise listed. For example, the EX Series has an additional satellite parameter available.

RELATED DOCUMENTATION

show chassis power

show flight-recorder status

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Syntax

```
show flight-recorder status
```

Description

Display the current status of the flight recorder tool and associated parameters, such as the running status of the tool, and the current data snapshot list.

Options

This command has no options.

Required Privilege Level

view

Output Fields

Table 7 on page 274 lists the output fields for the `show flight-recorder status` command. Output fields are listed in the approximate order in which they appear.

Table 7: show flight-recorder status Output Fields

Field Name	Field Description
`Flight-recorder status`	State of the flight recorder tool: • `Running`—The flight recorder tool is enabled using the `request flight-recorder set high-cpu` command. • `Not Running`—The flight recorder tool is not enabled. By default, the flight recorder tool is disabled.
`Recent Parameter Data`	Information about configured parameters for the flight recorder tool: • `Cpu-threshold`—Specify the maximum value of CPU utilization in percentage, beyond which the collection of data is triggered. • `Polling-frequency`—Specify the time in seconds for polling for high CPU utilization. • `Backoff-duration`—Specify the time interval in seconds between two snapshots of data. • `Num-snapshots`—Specify the number of snapshots of data to be collected before quitting the collection process.

Table 7: show flight-recorder status Output Fields *(Continued)*

Field Name	Field Description
Flags set	Information about additional flags configured for the flight recorder tool: • `Collect-core`—Perform snapshot collection of the running core with every snapshot of data taken. • `Logical System`—Enable data collection on logical systems.
Snapshot Directory	Log file that is recorded and saved in the flight recorder directory. The recorded snapshots and core log files are saved in a folder under the **/var/log/flight_recorder/** directory. The folder format is `Flr_MONTH_DD_YYYY_HH:MM:SS`; for example, `Flr_May_09_2018_02:20:50`.
List of snapshots	List of log files recorded and saved under the flight recorder directory.

Sample Output

show flight-recorder status

```
user@host> show flight-recorder status
Flight-recorder status: Not Running!

Recent Parameter Data:
Cpu-threshold           10
Polling-frequency       5
Backoff-duration        10
Num-snapshots           3

Flags set:
Collect-core flag is set
Logical System flag is Not set (default)

Snapshot Directory : Flr_Feb_22_2018_13:26:41

List of snapshots:
 flr_2018-02-22_13:26:41.txt
```

```
flr_2018-02-22_13:27:04.txt
flr_2018-02-22_13:27:28.txt
```

Release Information

Command introduced in Junos OS Release 18.2R1.

RELATED DOCUMENTATION

request flight-recorder set high-cpu | 166

show host

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Syntax

```
show host hostname
<routing-instance mgmt_junos>
<server server-name>
```

Syntax (Junos OS Evolved)

```
show host hostname
<routing-instance mgmt_junos>
<server server-name>
```

Syntax

Description

Display Domain Name System (DNS) hostname information.

Options

hostname	Hostname or address.
routing-instance mgmt_junos	(Optional) Side host server that is running.
server *server-name*	(Optional) Name server to use.

Additional Information

The `show host` command displays the raw data received from the name server.

Required Privilege Level

view

Sample Output

show host

```
user@host> show host device
device.example.net has address 192.0.2.0

user@host> show host 192.0.2.0
Name: device.example.net
```

```
Address: 192.0.2.0
Aliases:
```

Release Information

Command introduced before Junos OS Release 7.4.

`routing-instance mgmt_junos` option introduced in Junos OS Evolved Release 18.3R1.

`routing-instance mgmt_junos` option introduced in Junos OS Release 19.2R1.

show log

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Syntax

```
show log
<filename / user <username>>
```

Syntax (QFX Series and OCX Series)

```
show log filename
<device-type (device-id | device-alias)>
```

Syntax (TX Matrix Router)

```
show log
<all-lcc | lcc number | scc>
<filename / user <username>>
```

Description

List log files, display log file contents, or display information about users who have logged in to the router or switch.

NOTE: On MX Series routers, modifying a configuration to replace a service interface with another service interface is treated as a catastrophic event. When you modify a configuration, the entire configuration associated with the service interface—including NAT pools, rules, and service sets—is deleted and then re-created for the newly specified service interface. If there are active sessions associated with the service interface that is being replaced, these sessions are deleted and the NAT pools are then released, which leads to the generation of the NAT_POOL_RELEASE system log messages. However, because NAT pools are already deleted as a result of the catastrophic configuration change and no longer exist, the NAT_POOL_RELEASE system log messages are not generated for the changed configuration.

Options

none	List all log files.
<all-lcc | lcc *number* | scc>	(Routing matrix only)(Optional) Display logging information about all T640 routers (or line-card chassis) or a specific T640 router (replace *number* with a value from 0 through 3) connected to a TX Matrix router. Or, display logging information about the TX Matrix router (or switch-card chassis).
device-type	(QFabric system only) (Optional) Display log messages for only one of the following device types:

- `director-device`—Display logs for Director devices.
- `infrastructure-device`—Display logs for the logical components of the QFabric system infrastructure, including the diagnostic Routing Engine, fabric control Routing Engine, fabric manager Routing Engine, and the default network Node group and its backup (NW-NG-0 and NW-NG-0-backup).
- `interconnect-device`—Display logs for Interconnect devices.
- `node-device`—Display logs for Node devices.

> **NOTE**: If you specify the `device-type` optional parameter, you must also specify either the `device-id` or `device-alias` optional parameter.

(*device-id* | *device-alias*) — If a device type is specified, display logs for a device of that type. Specify either the device ID or the device alias (if configured).

filename — (Optional) Display the log messages in the specified log file. For the routing matrix, the filename must include the chassis information.

> **NOTE**: The *filename* parameter is mandatory for the QFabric system. If you did not configure a syslog filename, specify the default filename of **messages**.

user <*username*> — (Optional) Display logging information about users who have recently logged in to the router or switch. If you include *username*, display logging information about the specified user.

Required Privilege Level

trace

Sample Output

show log

```
user@host> show log
total 57518
-rw-r--r--  1 root  bin      211663 Oct  1 19:44 dcd
```

```
-rw-r--r--  1 root  bin      999947 Oct  1 19:41 dcd.0
-rw-r--r--  1 root  bin      999994 Oct  1 17:48 dcd.1
-rw-r--r--  1 root  bin      238815 Oct  1 19:44 rpd
-rw-r--r--  1 root  bin     1049098 Oct  1 18:00 rpd.0
-rw-r--r--  1 root  bin     1061095 Oct  1 12:13 rpd.1
-rw-r--r--  1 root  bin     1052026 Oct  1 06:08 rpd.2
-rw-r--r--  1 root  bin     1056309 Sep 30 18:21 rpd.3
-rw-r--r--  1 root  bin     1056371 Sep 30 14:36 rpd.4
-rw-r--r--  1 root  bin     1056301 Sep 30 10:50 rpd.5
-rw-r--r--  1 root  bin     1056350 Sep 30 07:04 rpd.6
-rw-r--r--  1 root  bin     1048876 Sep 30 03:21 rpd.7
-rw-rw-r--  1 root  bin       19656 Oct  1 19:37 wtmp
```

show log filename

```
user@host> show log rpd
Oct  1 18:00:18 trace_on: Tracing to ?/var/log/rpd? started
Oct  1 18:00:18 EVENT <MTU> ds-5/2/0.0 index 24 <Broadcast PointToPoint Multicast
Oct  1 18:00:18
Oct  1 18:00:19 KRT recv len 56 V9 seq 148 op add Type route/if af 2 addr 192.0.2.21 nhop type
local nhop 192.0.2.21
Oct  1 18:00:19 KRT recv len 56 V9 seq 149 op add Type route/if af 2 addr 192.0.2.22 nhop type
unicast nhop 192.0.2.22
Oct  1 18:00:19 KRT recv len 48 V9 seq 150 op add Type ifaddr index 24 devindex 43
Oct  1 18:00:19 KRT recv len 144 V9 seq 151 op chnge Type ifdev devindex 44
Oct  1 18:00:19 KRT recv len 144 V9 seq 152 op chnge Type ifdev devindex 45
Oct  1 18:00:19 KRT recv len 144 V9 seq 153 op chnge Type ifdev devindex 46
Oct  1 18:00:19 KRT recv len 1272 V9 seq 154 op chnge Type ifdev devindex 47
...

user@host:LSYS1> show log flow_lsys1.log
Nov  7 07:34:09 07:34:09.491800:CID-0:THREAD_ID-00:LSYS_ID-01:RT:got route table lock

Nov  7 07:34:09 07:34:09.491809:CID-0:THREAD_ID-00:LSYS_ID-01:RT:released route table lock

Nov  7 07:34:09 07:34:09.491840:CID-0:THREAD_ID-00:LSYS_ID-01:RT:got route table lock

Nov  7 07:34:09 07:34:09.491841:CID-0:THREAD_ID-00:LSYS_ID-01:RT:released route table lock

Nov  7 07:34:09 07:34:09.491854:CID-0:THREAD_ID-00:LSYS_ID-01:RT:cache final sw_nh 0x0
```

```
Nov  7 07:34:09 07:34:09.491868:CID-0:THREAD_ID-00:LSYS_ID-01:RT:got route table lock

Nov  7 07:34:09 07:34:09.491869:CID-0:THREAD_ID-00:LSYS_ID-01:RT:released route table lock

Nov  7 07:34:09 07:34:09.491881:CID-0:THREAD_ID-00:LSYS_ID-01:RT:cache final sw_nh 0x0
user@host:TSYS1> show log flow_tsys1.log
Nov  7 13:21:47 13:21:47.217744:CID-0:THREAD_ID-05:LSYS_ID-32:RT:<192.0.2.0/0-
>198.51.100.0/9011;1,0x0> :

Nov  7 13:21:47 13:21:47.217747:CID-0:THREAD_ID-05:LSYS_ID-32:RT:packet [84] ipid = 39281,
@0x7f490ae56d52

Nov  7 13:21:47 13:21:47.217749:CID-0:THREAD_ID-05:LSYS_ID-32:RT:---- flow_process_pkt: (thd 5):
flow_ctxt type 0, common flag 0x0, mbuf 0x4882b600, rtbl7

Nov  7 13:21:47 13:21:47.217752:CID-0:THREAD_ID-05:LSYS_ID-32:RT: flow process pak fast ifl 88
in_ifp lt-0/0/0.101

Nov  7 13:21:47 13:21:47.217753:CID-0:THREAD_ID-05:LSYS_ID-32:RT:  lt-0/0/0.101:192.0.2.0-
>198.51.100.0, icmp, (0/0)

Nov  7 13:21:47 13:21:47.217756:CID-0:THREAD_ID-05:LSYS_ID-32:RT: find flow: table 0x11d0a2680,
hash 20069(0xffff), sa 192.0.2.0, da 198.51.100.0, sp 0, d0

Nov  7 13:21:47 13:21:47.217760:CID-0:THREAD_ID-05:LSYS_ID-32:RT:Found: session id 0x12. sess
tok 28685

Nov  7 13:21:47 13:21:47.217761:CID-0:THREAD_ID-05:LSYS_ID-32:RT:  flow got session.

Nov  7 13:21:47 13:21:47.217761:CID-0:THREAD_ID-05:LSYS_ID-32:RT:  flow session id 18

Nov  7 13:21:47 13:21:47.217763:CID-0:THREAD_ID-05:LSYS_ID-32:RT: vector bits 0x200 vector
0x84ae85f0

Nov  7 13:21:47 13:21:47.217764:CID-0:THREAD_ID-05:LSYS_ID-32:RT:set nat 0x11e463550(18) timeout
const to 2

Nov  7 13:21:47 13:21:47.217765:CID-0:THREAD_ID-05:LSYS_ID-32:RT: set_nat_timeout 2 on session 18

Nov  7 13:21:47 13:21:47.217765:CID-0:THREAD_ID-05:LSYS_ID-32:RT:refresh nat 0x11e463550(18)
timeout to 2

Nov  7 13:21:47 13:21:47.217767:CID-0:THREAD_ID-05:LSYS_ID-32:RT:insert usp tag for apps
```

```
Nov  7 13:21:47 13:21:47.217768:CID-0:THREAD_ID-05:LSYS_ID-32:RT:mbuf 0x4882b600, exit nh
0xfffb0006
```

show log filename (QFabric System)

```
user@qfabric> show log messages
Mar 28 18:00:06 qfabric chassisd: QFABRIC_INTERNAL_SYSLOG: Mar 28 18:00:06 ED1486 chassisd:
CHASSISD_SNMP_TRAP10: SNMP trap generated: FRU power on (jnxFruContentsIndex 8, jnxFruL1Index 1,
jnxFruL2Index 1, jnxFruL3Index 0, jnxFruName PIC: 48x 10G-SFP+ @ 0/0/*, jnxFruType 11,
jnxFruSlot 0, jnxFruOfflineReason 2, jnxFruLastPowerOff 0, jnxFruLastPowerOn 2159)
Mar 28 18:00:07 qfabric chassisd: QFABRIC_INTERNAL_SYSLOG: Mar 28 18:00:07 ED1486 chassisd:
CHASSISD_SNMP_TRAP10: SNMP trap generated: FRU power on (jnxFruContentsIndex 8, jnxFruL1Index 1,
jnxFruL2Index 2, jnxFruL3Index 0, jnxFruName PIC:  @ 0/1/*, jnxFruType 11, jnxFruSlot 0,
jnxFruOfflineReason 2, jnxFruLastPowerOff 0, jnxFruLastPowerOn 2191)
Mar 28 18:00:07 qfabric chassisd: QFABRIC_INTERNAL_SYSLOG: Mar 28 18:00:07 ED1492 chassisd:
CHASSISD_SNMP_TRAP10: SNMP trap generated: FRU power on (jnxFruContentsIndex 8, jnxFruL1Index 1,
jnxFruL2Index 1, jnxFruL3Index 0, jnxFruName PIC: 48x 10G-SFP+ @ 0/0/*, jnxFruType 11,
jnxFruSlot 0, jnxFruOfflineReason 2, jnxFruLastPowerOff 0, jnxFruLastPowerOn 242726)
Mar 28 18:00:07 qfabric chassisd: QFABRIC_INTERNAL_SYSLOG: Mar 28 18:00:07 ED1492 chassisd:
CHASSISD_SNMP_TRAP10: SNMP trap generated: FRU power on (jnxFruContentsIndex 8, jnxFruL1Index 1,
jnxFruL2Index 2, jnxFruL3Index 0, jnxFruName PIC:  @ 0/1/*, jnxFruType 11, jnxFruSlot 0,
jnxFruOfflineReason 2, jnxFruLastPowerOff 0, jnxFruLastPowerOn 242757)
Mar 28 18:00:16 qfabric file: QFABRIC_INTERNAL_SYSLOG: Mar 28 18:00:16 ED1486 file: UI_COMMIT:
User 'root' requested 'commit' operation (comment: none)
Mar 28 18:00:27 qfabric file: QFABRIC_INTERNAL_SYSLOG: Mar 28 18:00:27 ED1486 file: UI_COMMIT:
User 'root' requested 'commit' operation (comment: none)
Mar 28 18:00:50 qfabric file: QFABRIC_INTERNAL_SYSLOG: Mar 28 18:00:50 _DCF_default___NW-
INE-0_RE0_ file: UI_COMMIT: User 'root' requested 'commit' operation (comment: none)
Mar 28 18:00:50 qfabric file: QFABRIC_INTERNAL_SYSLOG: Mar 28 18:00:50 _DCF_default___NW-
INE-0_RE0_ file: UI_COMMIT: User 'root' requested 'commit' operation (comment: none)
Mar 28 18:00:55 qfabric file: QFABRIC_INTERNAL_SYSLOG: Mar 28 18:00:55 ED1492 file: UI_COMMIT:
User 'root' requested 'commit' operation (comment: none)
Mar 28 18:01:10 qfabric file: QFABRIC_INTERNAL_SYSLOG: Mar 28 18:01:10 ED1492 file: UI_COMMIT:
User 'root' requested 'commit' operation (comment: none)
Mar 28 18:02:37 qfabric chassisd: QFABRIC_INTERNAL_SYSLOG: Mar 28 18:02:37 ED1491 chassisd:
CHASSISD_SNMP_TRAP10: SNMP trap generated: FRU power on (jnxFruContentsIndex 8, jnxFruL1Index 1,
jnxFruL2Index 1, jnxFruL3Index 0, jnxFruName PIC: 48x 10G-SFP+ @ 0/0/*, jnxFruType 11,
jnxFruSlot 0, jnxFruOfflineReason 2, jnxFruLastPowerOff 0, jnxFruLastPowerOn 33809)
```

show log user

```
user@host> show log user
usera    mg2546                  Thu Oct  1 19:37   still logged in
usera    mg2529                  Thu Oct  1 19:08 - 19:36  (00:28)
usera    mg2518                  Thu Oct  1 18:53 - 18:58  (00:04)
root     mg1575                  Wed Sep 30 18:39 - 18:41  (00:02)
root     ttyp2    aaa.bbbb.com   Wed Sep 30 18:39 - 18:41  (00:02)
userb    ttyp1    192.0.2.0      Wed Sep 30 01:03 - 01:22  (00:19)
```

show log accepted-traffic (SRX4600, SRX5400, SRX5600, and SRX5800)

```
user@host> show log accepted-traffic
Jul 17 20:26:04  sourpunch RT_FLOW: RT_FLOW_SESSION_CREATE: session created 3.3.3.5/2-
>4.4.4.2/63 0x0 None 3.3.3.5/2->4.4.4.2/63 0x0 N/A N/A N/A N/A 17 p2 TRUST UNTRUST 2617282058
N/A(N/A) xe-7/0/0.0 UNKNOWN UNKNOWN UNKNOWN N/A N/A -1 N/A N/A N/A
Jul 17 20:26:04  sourpunch RT_FLOW: RT_FLOW_SESSION_CREATE: session created 3.3.3.4/4-
>4.4.4.2/63 0x0 None 3.3.3.4/4->4.4.4.2/63 0x0 N/A N/A N/A N/A 17 p2 TRUST UNTRUST 2550162754
N/A(N/A) xe-7/0/0.0 UNKNOWN UNKNOWN UNKNOWN N/A N/A -1 N/A N/A N/A
Jul 17 20:26:04  sourpunch RT_FLOW: RT_FLOW_SESSION_CREATE: session created 3.3.3.4/1-
>4.4.4.2/63 0x0 None 3.3.3.4/1->4.4.4.2/63 0x0 N/A N/A N/A N/A 17 p2 TRUST UNTRUST 2550162755
N/A(N/A) xe-7/0/0.0 UNKNOWN UNKNOWN UNKNOWN N/A N/A -1 N/A N/A N/A
Jul 17 20:26:04  sourpunch RT_FLOW: RT_FLOW_SESSION_CREATE: session created 3.3.3.3/0-
>4.4.4.2/63 0x0 None 3.3.3.3/0->4.4.4.2/63 0x0 N/A N/A N/A N/A 17 p2 TRUST UNTRUST 2550162752
N/A(N/A) xe-7/0/0.0 UNKNOWN UNKNOWN UNKNOWN N/A N/A -1 N/A N/A N/A
Jul 17 20:26:04  sourpunch RT_FLOW: RT_FLOW_SESSION_CREATE: session created 3.3.3.5/5-
>4.4.4.2/63 0x0 None 3.3.3.5/5->4.4.4.2/63 0x0 N/A N/A N/A N/A 17 p2 TRUST UNTRUST 2550162751
N/A(N/A) xe-7/0/0.0 UNKNOWN UNKNOWN UNKNOWN N/A N/A -1 N/A N/A N/A
Jul 17 20:26:04  sourpunch RT_FLOW: RT_FLOW_SESSION_CREATE: session created 3.3.3.3/3-
>4.4.4.2/63 0x0 None 3.3.3.3/3->4.4.4.2/63 0x0 N/A N/A N/A N/A 17 p2 TRUST UNTRUST 2550162753
N/A(N/A) xe-7/0/0.0 UNKNOWN UNKNOWN UNKNOWN N/A N/A -1 N/A N/A N/A
```

Release Information

Command introduced before Junos OS Release 7.4.

Option *device-type (device-id | device-alias)* is introduced in Junos OS Release 13.1 for the QFX Series.

RELATED DOCUMENTATION

- syslog (System)

show system connections

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Syntax

```
show system connections
<extensive>
<inet | inet6>
<show-routing-instances>
```

Syntax (EX Series)

```
show system connections
<extensive>
<all-members>
<inet | inet6>
<local>
<member member-id>
<show-routing-instances>
```

Syntax (TX Matrix Router)

```
show system connections
<extensive>
<all-chassis | all-lcc | lcc number | scc>
<inet | inet6>
<show-routing-instances>
```

Syntax (TX Matrix Plus Router)

```
show system connections
<extensive>
<all-chassis | all-lcc | lcc number | sfc number>
<inet | inet6>
<show-routing-instances>
```

Syntax (MX Series Router)

```
show system connections
<extensive>
<all-members>
<inet | inet6>
<local>
<member member-id>
<show-routing-instances>
```

Syntax (QFX Series)

```
show system connections
<extensive>
<inet>
<infrastructure name>
<interconnect-device name>
<node-group name>
<show-routing-instances>
```

Syntax (OCX Series)

```
show system connections
<extensive>
<inet>
<show-routing-instances>
```

Syntax (Junos OS Evolved)

```
show system connections
<inet | inet6>
<node node-name>
```

Description

Display information about the active IP sockets on the Routing Engine. Use this command to verify which servers are active on a system and what connections are currently in progress.

Options

none	Display information about all active IP sockets on the Routing Engine.
extensive	(Optional) Display exhaustive system process information, which, for TCP connections, includes the TCP control block and MSS. This option is useful for debugging TCP connections.

all-chassis	(TX Matrix routers and TX Matrix Plus routers only) (Optional) Display system connection activity for all the routers in the chassis.
all-lcc	(TX Matrix routers and TX Matrix Plus routers only) (Optional) On a TX Matrix router, display system connection activity for all T640 routers connected to the TX Matrix router. On a TX Matrix Plus router, display system connection activity for all connected T1600 or T4000 LCCs
all-members	(EX4200 switches and MX Series routers only) (Optional) Display system connection activity for all members of the Virtual Chassis configuration.
inet | inet6	(Optional) Display IPv4 connections or IPv6 connections, respectively.
infrastructure *name*	(QFabric systems only) (Optional) Display system connection activity for the fabric control Routing Engines or fabric manager Routing Engines.
interconnect-device *name*	(QFabric systems only) (Optional) Display system connection activity for the Interconnect device.
lcc *number*	(TX Matrix routers and TX Matrix Plus routers only) (Optional) On a TX Matrix router, display system connection activity for a specific T640 router that is connected to the TX Matrix router. On a TX Matrix Plus router, display system connection activity for a specific router that is connected to the TX Matrix Plus router. Replace *number* with the following values depending on the LCC configuration: • 0 through 3, when T640 routers are connected to a TX Matrix router in a routing matrix. • 0 through 3, when T1600 routers are connected to a TX Matrix Plus router in a routing matrix. • 0 through 7, when T1600 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix. • 0, 2, 4, or 6, when T4000 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.
local	(EX4200 switches and MX Series routers only) (Optional) Display system connection activity for the local Virtual Chassis member.
member *member-id*	(EX4200 switches and MX Series routers only) (Optional) Display system connection activity for the specified member of the Virtual Chassis configuration.

	For EX4200 switches, replace *member-id* with a value from 0 through 9. For an MX Series Virtual Chassis, replace *member-id* with a value of 0 or 1.
node *node-name*	(Junos OS Evolved only) (Optional) Display system connection activity for the specified node.
node-group *name*	(QFabric systems only) (Optional) Display system connection activity for the Node group.
scc	(TX Matrix routers only) (Optional) Display system connection activity for the TX Matrix router (or switch-card chassis).
sfc	(TX Matrix routers only) (Optional) Display system connection activity for the TX Matrix Plus router.
show-routing-instances	(Optional) Display routing instances.

Additional Information

By default, when you issue the `show system connections` command on the primary Routing Engine of a TX Matrix router or a TX Matrix Plus router, the command is broadcast to all the primary Routing Engines of the LCCs connected to it in the routing matrix. Likewise, if you issue the same command on the backup Routing Engine of a TX Matrix or a TX Matrix Plus router, the command is broadcast to all backup Routing Engines of the LCCs that are connected to it in the routing matrix.

NOTE: The device calculates the TCP MSS value as described in RFC 6691.

Required Privilege Level

view

Output Fields

Table 8 on page 290 describes the output fields for the `show system connections` command. Output fields are listed in the approximate order in which they appear.

Table 8: show system connections Output Fields

Field Name	Field Description
Proto	Protocol of the socket: IP, TCP, or UDP for IPv4 or IPv6.
Recv-Q	Number of input bytes received by the protocol and waiting to be processed by the application.
Send-Q	Number of output bytes sent by the application and waiting to be processed by the protocol.
Local Address	Local address and port of the socket, separated by a period. An asterisk (*) indicates that the bound address is the wildcard address. Server sockets typically have the wildcard address and a well-known port bound to them.
Foreign Address	Foreign address and port of the socket, separated by a period. An asterisk (*) indicates that the address or port is a wildcard.
Routing Instance	(Displayed only when the show-routing-instance option is used.) Routing instances associated with active IP sockets on the Routing Engine.
(state)	For TCP, the protocol state of the socket.

Sample Output

show system connections

```
user@host> show system connections
Active Internet connections (including servers)
Proto Recv-Q Send-Q  Local Address          Foreign Address        (state)
tcp        0      2  192.0.2.16.513       192.0.2.254.894    ESTABLISHED
tcp        0      0  192.0.2.16.513       192.0.2.195.945    ESTABLISHED
tcp        0      0  *.23                   *.*                    LISTEN
tcp        0      0  *.22                   *.*                    LISTEN
tcp        0      0  *.513                  *.*                    LISTEN
tcp00 *.514      *.*                   LISTEN
```

```
tcp 0 0*.21      *.*                    LISTEN
tcp00 *.79     *.*                    LISTEN
tcp 00 *.1023     *.*                     LISTEN
tcp 00 *.111     *.*                    LISTEN
udp00192.192.0.2.1634     192.0.2.249.2049
udp00192.192.0.2.1627     192.0.2.254.2049
udp00192.192.0.2.1371     192.0.2.195.2049
udp00*.*      *.*
udp00*.9999     *.*
udp00 *.161     *.*
udp00192.192.0.2.1039     192.0.2.16.1023
udp00192.192.0.2.1038     192.0.2.16.1023
udp 00 192.0.2.16.1037     192.0.2.16.1023
udp00 192.0.2.16.1036     192.0.2.16.1023
udp00*.1022     *.*
udp00*.1023     *.*
udp00*.111     *.*
udp00*.*      *.*
```

show system connections extensive

```
user@host> show system connections extensive

Active Internet connections (including servers)
Proto Recv-Q Send-Q  Local Address                                Foreign
Address                               (state)
tcp4       0      6  192.0.2.15.23
192.0.2.138.3013                          ESTABLISHED
   sndsbcc:          6 sndsbmbcnt:        256  sndsbmbmax:     272000
sndsblowat:       2048 sndsbhiwat:      34000
   rcvsbcc:          0 rcvsbmbcnt:          0  rcvsbmbmax:     533120
rcvsblowat:          1 rcvsbhiwat:      66640
   proc id:          0  proc name:
       iss: 2566994072      sndup: 2566994491
    snduna: 2566994491     sndnxt: 2566994494      sndwnd:      64094
    sndmax: 2566994494    sndcwnd:       6589 sndssthresh:       2720
       irs:  236981199      rcvup:  236981325
    rcvnxt:  236981327     rcvadv:  237046862      rcvwnd:      66640
       rtt:  140058623       srtt:      15519        rttv:        908
    rxtcur:       1200   rxtshift:          0       rtseq: 2566994491
    rttmin:       1000  mss:       1360
```

```
     flags: SACK_PERMIT [0x2000200]
tcp4       0      0  10.255.165.93.179
10.255.165.203.65141                       ESTABLISHED
   sndsbcc:          0 sndsbmbcnt:          0  sndsbmbmax:     131072
sndsblowat:       2048 sndsbhiwat:      16384
   rcvsbcc:          0 rcvsbmbcnt:          0  rcvsbmbmax:     131072
rcvsblowat:          1 rcvsbhiwat:      16384
   proc id:          0  proc name:
       iss: 2555961065      sndup: 2555995917
    snduna: 2555995917     sndnxt: 2555995917      sndwnd:      16384
    sndmax: 2555995917    sndcwnd:       1000 sndssthresh: 1073725440
       irs: 2123825753      rcvup: 2123860681
    rcvnxt: 2123860681     rcvadv: 2123877065      rcvwnd:      16384
       rtt:          0       srtt:       3309        rttv:         72
    rxtcur:       1200   rxtshift:          0       rtseq: 2555995898
    rttmin:       1000  mss:        500
     flags: REQ_SCALE RCVD_SCALE REQ_TSTMP RCVD_TSTMP SACK_PERMIT [0x3e0]
tcp4       0      0  10.255.165.203.65141
10.255.165.93.179                          ESTABLISHED
   sndsbcc:          0 sndsbmbcnt:          0  sndsbmbmax:     131072
sndsblowat:       2048 sndsbhiwat:      16384
   rcvsbcc:          0 rcvsbmbcnt:          0  rcvsbmbmax:     131072
rcvsblowat:          1 rcvsbhiwat:      16384
   proc id:       5022  proc name:        rpd
       iss: 2123825753      sndup: 2123860662
    snduna: 2123860681     sndnxt: 2123860681      sndwnd:      16384
    sndmax: 2123860681    sndcwnd:       1000 sndssthresh: 1073725440
       irs: 2555961065      rcvup: 2555995917
    rcvnxt: 2555995917     rcvadv: 2556012301      rcvwnd:      16384
       rtt:          0       srtt:       3279        rttv:         22
    rxtcur:       1200   rxtshift:          0       rtseq: 2123860662
    rttmin:       1000  mss:        500
     flags: REQ_SCALE RCVD_SCALE REQ_TSTMP RCVD_TSTMP SACK_PERMIT [0x100003e0]
tcp4       0      0  10.255.165.203.179
10.255.165.113.52404                       ESTABLISHED
   sndsbcc:          0 sndsbmbcnt:          0  sndsbmbmax:     131072
sndsblowat:       2048 sndsbhiwat:      16384
   rcvsbcc:          0 rcvsbmbcnt:          0  rcvsbmbmax:     131072
rcvsblowat:          1 rcvsbhiwat:      16384
   proc id:          0  proc name:
       iss: 1109297190      sndup: 1109332099
    snduna: 1109332118     sndnxt: 1109332118      sndwnd:      16384
    sndmax: 1109332118    sndcwnd:       1000 sndssthresh: 1073725440
```

```
        irs: 1476831634      rcvup: 1476866449
    rcvnxt: 1476866449     rcvadv: 1476882833      rcvwnd:      16384
       rtt:          0       srtt:       3235        rttv:         18
    rxtcur:       1200   rxtshift:          0       rtseq: 1109332099
    rttmin:       1000  mss:        500
     flags: REQ_SCALE RCVD_SCALE REQ_TSTMP RCVD_TSTMP SACK_PERMIT [0x3e0]
```

show system connections show-routing-instances

```
user@host> show system connections show-routing-instances
Active Internet connections (including servers) (including routing-instances)
Proto Recv-Q Send-Q  Local Address          Foreign Address        Routing Instance       (state)
tcp4       0      0  192.0.2.204.23      192.0.2.19.4267      default                ESTABLISHED
tcp4       0      0  192.0.2.204.58540   10.209.7.138.23        default
ESTABLISHED
tcp4       0      0  192.0.2.204.23      192.0.2.19.1098      default                ESTABLISHED
tcp4       0      0  192.0.2.1.57668      192.0.2.1.179        default                ESTABLISHED
tcp4       0      0  192.0.2.1.179        192.0.2.1.49209      default                ESTABLISHED
tcp4       0      0  192.0.2.1.6234         192.0.2.17.1024        __juniper_private1__
ESTABLISHED
tcp4       0      0  192.0.2.4.9000         192.0.24.59103        __juniper_private1__
ESTABLISHED
tcp4       0      0  1192.0.2.4.59103        192.0.2.4.9000         __juniper_private1__
ESTABLISHED
tcp4       0      0  *.32012                *.*                    __juniper_private1__   LISTEN
tcp4       0      0  *.9000                 *.*                    __juniper_private1__   LISTEN
tcp4       0      0  *.33007                *.*                    __juniper_private2__   LISTEN
tcp46      0      0  *.179                  *.*                    default                LISTEN
tcp4       0      0  *.179                  *.*                    default                LISTEN
tcp4       0      0  *.6154                 *.*                    __juniper_private1__   LISTEN
tcp4       0      0  *.6153                 *.*                    __juniper_private1__   LISTEN
tcp4       0      0  *.7000                 *.*                    __juniper_private1__   LISTEN
tcp4       0      0  *.6152                 *.*                    __juniper_private1__   LISTEN
tcp4       0      0  *.6156                 *.*                    __juniper_private1__   LISTEN
tcp4       0      0  *.33005                *.*                    __juniper_private2__   LISTEN
tcp4       0      0  *.31343                *.*                    __juniper_private1__   LISTEN
tcp4       0      0  *.31341                *.*                    __juniper_private1__   LISTEN
tcp4       0      0  *.32003                *.*                    __juniper_private2__   LISTEN
tcp4       0      0  *.666                  *.*                    __juniper_private1__   LISTEN
```

```
tcp4       0      0  *.38                   *.*                    __juniper_private1__   LISTEN
tcp4       0      0  *.3221                 *.*                    default                LISTEN
```

show system connections | find sctp

```
user@host> show system connections | find sctp
Active SCTP associations (including servers)
Proto  Type  Local Address          Foreign Address        (state)
sctp4  1to1  30.30.30.1.50000       20.20.20.2.62324       ESTABLISHED
             20.20.20.1.50000       30.30.30.2.62324
```

Release Information

Command introduced before Junos OS Release 7.4.

`sfc` option introduced for the TX Matrix Plus router in Junos OS Release 9.6.

Options `extensive` and `show-routing-instance` deprecated in Junos OS Evolved Release 17.3.

`node` option introduced in Junos OS Evolved Release 18.3R1.

RELATED DOCUMENTATION

Routing Matrix with a TX Matrix Plus Router Solutions Page

show system name-resolution

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Syntax

```
show system name-resolution
```

Description

Display hostname-to-IP-address mappings.

Options

This command has no options.

Required Privilege Level

view

Output Fields

Table 9 on page 295 lists the output fields for the `show system name-resolution` command. Output fields are listed in the approximate order in which they appear.

Table 9: show system name-resolution Output Fields

Field Name	Field Description
Last update	Date and time when the hostname-to-IP address mapping were last resolved.
Refresh interval	Interval for refreshing the cache with the updated hostname-to-IP address mappings.
Addresses	Resolved IP addresses based on the hostname-to-IP address mappings.
Error	Error message displayed if there is a DNS hostname lookup failure.

Table 9: show system name-resolution Output Fields *(Continued)*

Field Name	Field Description
Last change	Timestamp for the last change in the hostname-to-IP address mappings.

show system name-resolution

command-name

```
user@host> show system name-resolution

Hostname to IP-address mappings:
------------------------------------------------
 Last update: Mon Sep 29 18:42:21 2008
 Refresh interval: 600 secs
 Host: ntp1
      Addresses:
        3.3.3.11
      Last change: Mon Sep 29 18:42:20 2008
 Host: radauth1
      Error: Host name lookup failure
Last change: Mon Sep 29 18:42:20 2008
Host: radacct1
      Error: Host name lookup failure
Host: snmp1
      Addresses:
        4.4.4.1
        4.4.4.2
      Last change: Mon Sep 29 18:45:20 2008
Host: sys1
      Addresses:
        192.168.68.69
      Last change: Mon Sep 29 18:42:21 2008
```

Release Information

Command introduced in Junos OS Release 9.6.

show version (Junos OS)

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Syntax

```
show version
<brief | detail>
```

Syntax (EX Series Switches)

```
show version
<all-members>
<brief | detail>
<local>
<member member-id>
```

Syntax (MX Series Router)

```
show version
<brief | detail>
<all-members>
```

```
<local>
<member member-id>
```

Syntax (QFX Series)

```
show version
<brief | detail>
<component component-name | all>
```

Syntax (SRX Series)

```
show version
<brief | detail>
<node node-id | local | primary>
```

Description

Display the hostname and version information about the software running on the router or switch.

Beginning in Junos OS Release 13.3, the `show version` command output includes the `Junos` field that displays the Junos OS version, including any selective upgrade (JSU) packages, running on the device. This field provides a consistent means of identifying the Junos OS version, rather than extracting that information from the list of installed sub-packages.

Table 10: Common Package Prefixes for Junos OS

Junos OS Package Prefix	Junos OS Architecture
jinstall-*	Junos OS for M Series, MX Series, and T Series, routers
junos-install-*	Junos OS based on an upgraded FreeBSD kernel instead of older versions of FreeBSD
junos-vmhost-install-*	Junos OS with upgraded FreeBSD on a VM Host

Options

none	Display standard information about the hostname and version of the software running on the router or switch.
brief | detail	(Optional) Display the specified level of output.
all-members	(EX4200 switches and MX Series routers only) (Optional) Display standard information about the hostname and version of the software running on all members of the Virtual Chassis configuration.
component all	(QFabric systems only) (Optional) Display the host name and version information about the software running on all the components on the QFabric system.
component *component-name*	(QFabric systems only) (Optional) Display the host name and version information about the software running on a specific QFabric system component. Replace *component-name* with the name of the QFabric system component. The *component-name* can be the name of a diagnostics Routing Engine, Director group, fabric control Routing Engine, fabric manager Routing Engine, Interconnect device, or Node group.
local	(EX4200 switches and MX Series routers only) (Optional) Display standard information about the hostname and version of the software running on the local Virtual Chassis member.
member *member-id*	(EX4200 switches and MX Series routers only) (Optional) Display standard information about the hostname and version of the software running on the specified member of the Virtual Chassis configuration. For EX4200 switches, replace *member-id* with a value from 0 through 9. For an MX Series Virtual Chassis, replace *member-id* with a value of 0 or 1.
node (all | *node-name)*	(Optional) Display version information for the specified node or all nodes.
primary	(SRX Series only) Display the software version on the primary node.

Required Privilege Level

view

Release Information

Command introduced before Junos OS Release 7.4.

start shell

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Syntax

```
start shell (csh | sh)
<user username>
```

Description

Exit from the CLI environment and create a UNIX-level shell. To return to the CLI, type `exit` from the shell.

Juniper Networks does not provide support for operations in the shell.

NOTE:

- To issue this command, the user must have the required login access privileges configured by including the `permissions` statement at the `[edit system login class class-name]` hierarchy level.
- UNIX wheel group membership or permissions are no longer required to issue this command.

Options

csh	Create a UNIX C shell.
sh	Create a UNIX Bourne shell.
user *username*	(Optional) Start the shell as another user.

Additional Information

When you are in the shell, the shell prompt has the following format:

```
username@hostname%
```

An example of the prompt is:

```
root@host%
```

Required Privilege Level

shell or maintenance

Output Fields

When you enter this command, you are provided feedback on the status of your request.

Sample Output

start shell csh

```
user@host> start shell csh
%

exit
%

username@hostname% start shell sh
%
```

```
exit
user@host>
```

Release Information

Command introduced before Junos OS Release 7.4.

CHAPTER 10

System Software Monitoring Commands

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show fib-local-accounting ip

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Syntax

```
show fib-local-accounting ip
```

Description

Display the number of packets that were sent to an anchor MPC due to FIB localization.

Required Privilege Level

view

Sample Output

show fib-local-accounting ip

```
user@host> show fib-local-accounting ip
PFE 0
         fe_addr         packets         bytes
         28                      0                     0
         29                      0                     0
         30                      0                     0
         31                      0                     0
PFE 1
```

```
fe_addr         packets         bytes
28                      0                       0
29                      0                       0
30                      0                       0
31                      0                       0
```

Release Information

Command introduced in Junos OS Release 12.3.

RELATED DOCUMENTATION

fib-remote | 102

fib-local | 101

Example: Configuring Packet Forwarding Engine FIB Localization | 30

show system commit

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Syntax

```
show system commit
<revision | server | synchronize-server pending-jobs | include-configuration-revision>
```

Description

Display the system commit history and pending commit operations.

Options

none	Display the last 50 commit operations on the static configuration database, starting with the most recent.
revision	(Optional) Display the revision number of the active configuration of the Routing Engine(s).
server	(Optional) Display the commit server status.

> **NOTE**: By default, the status of the commit server is “Not running”. The commit server starts running only when a commit job is added to the batch.

synchronize-server pending-jobs	(Optional) Display the pending commit synchronize operations for all instances of the ephemeral configuration database on an MX Series Virtual Chassis or a device with dual Routing Engines. This option can only be executed on the primary Routing Engine of the Virtual Chassis primary router or the dual Routing Engine system.
include-configuration-revision	(Optional) Display configuration revision information including the revision identifier string for each commit record.

Required Privilege Level

view

Output Fields

Table 11 on page 307 describes the output fields for the `show system commit` command. Output fields are listed in the approximate order in which they appear.

Table 11: show system commit Output Fields

Field Name	Field Description	Level of Output
<number>	Displays the last 50 commit operations listed, most recent to first. The identifier *<number>* designates a configuration created for recovery using the `request system configuration rescue save` command.	none
<time-stamp>	Date and time of the commit operation.	none
<root>/ *<username>*	User who executed the commit operation.	none
<method>	Method used to execute the commit operation: • `CLI`—CLI interactive user performed the commit operation. • `Junos XML protocol`—Junos XML protocol client performed the commit operation. • `synchronize`—The `commit synchronize` command was performed on the other Routing Engine. • `snmp`—An SNMP `set` request caused the commit operation. • `button`—A button on the router or switch was pressed to commit a rescue configuration for recovery. • `autoinstall`—A configuration obtained through autoinstallation was committed. • `other`—When there is no login name associated with the session, the values for user and client default to root and other. For example, during a reboot after package installation, mgd commits the configuration as a system commit, and there is no login associated with the commit.	none
<rollback pending>	Identifies whether `commit confirmed` is issued. It is removed once `commit` or `commit check` is issued or `commit confirmed` is rolled back after rollback timeout.	none

Sample Output

show system commit

```
user@host> show system commit
0   2003-07-28 19:14:04 PDT by root via other
1   2003-07-25 22:01:36 PDT by user via cli
2   2003-07-25 22:01:32 PDT by user via cli
3   2003-07-25 21:30:13 PDT by root via button
4   2003-07-25 13:46:48 PDT by user via cli
5   2003-07-25 05:33:21 PDT by root via autoinstall
...
rescue  2002-05-10 15:32:03 PDT by root via other
```

show system commit (At a Particular Time)

```
user@host> show system commit
commit requested by root via cli at Tue May  7 15:59:00 2002
```

show system commit (At the Next Reboot)

```
user@host> show system commit
commit requested by root via cli at reboot
```

show system commit (Rollback Pending)

```
user@host> show system commit
0   2022-05-06 06:33:42 PDT by root via cli commit confirmed, rollback in 10mins
```

show system commit (QFX Series)

```
user@switch> show system commit
0   2011-11-25 19:17:49 PST by root via cli
```

show system commit synchronize-server pending-jobs

```
user@host> show system commit synchronize-server pending-jobs
Job Id                Commit Synchronize Model       Database                  Version
36                    Asynchronous Commit            ephemeral                 130
37                    Asynchronous Commit            ephemeral                 131
38                    Asynchronous Commit            ephemeral                 132
39                    Asynchronous Commit            ephemeral                 133
40                    Asynchronous Commit            ephemeral                 134
41                    Asynchronous Commit            ephemeral                 135
42                    Asynchronous Commit            ephemeral                 2
```

show system commit include-configuration-revision

```
user@host> show system commit include-configuration-revision
0   2020-08-02 00:42:58 IST by user via cli re0-1596309177-4
1   2020-08-02 00:42:53 IST by user via cli re0-1596309173-3
2   2020-08-02 00:42:50 IST by user via cli re0-1596309170-2
3   2020-08-02 00:42:40 IST by user via other re0-1596309160-1
```

Release Information

Command introduced before Junos OS Release 7.4.

Option `server` introduced in Junos OS Release 12.1 for the PTX Series router.

Option `revision` introduced in Junos OS Release 14.1.

Option `synchronize-server` introduced in Junos OS Release 17.2R1 and Junos OS Evolved Release 22.1R1.

Option `include-configuration-revision` introduced in Junos OS Release 20.4R1 and Junos OS Evolved Release 20.4R1.

RELATED DOCUMENTATION

clear system commit

show system commit revision

show system configuration database usage

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Syntax

```
show system configuration database usage
```

Description

Display configuration database disk space usage statistics.

Options

This command has no options.

Required Privilege Level

maintenance

Output Fields

Table 12 on page 311 describes the output fields for the `show system configuration database usage` command. Output fields are listed in the approximate order in which they appear.

Table 12: show system configuration database usage Output Fields

Field Name	Field Description
`Maximum size of the database`	Display the maximum available space on the disk to store the configuration database
`Current database size on disk`	Display the total space on the disk used by the current configuration database
`Actual database usage`	Display the actual space on the disk used by the current configuration data
`Available database space`	Display the free space available on the disk to store the configuration database

Sample Output

show system configuration database usage

```
user@host> show system configuration database usage
Maximum size of the database: 665.99 MB
Current database size on disk: 1.50 MB
Actual database usage: 1.48 MB
Available database space: 664.51 MB
```

Release Information

Command introduced in Junos OS Release 15.1.

RELATED DOCUMENTATION

Overview for Junos OS

show system information

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Syntax

```
show system information
```

Description

Display high-level system information for the device including the model number, device family, Junos OS release, and hostname.

Options

none Display system information for the device.

Required Privilege Level

view

Sample Output

show system information

```
user@host> show system information
Model: mx960
Family: junos
Junos: 17.2R1
Hostname: host
```

Release Information

Command introduced in Junos OS Release 17.2.

show system processes

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Syntax

```
show system processes
<brief | detail | extensive | summary>
<health (pid process-identifer | process-name process-name)>
<providers>
<resource-limits (brief | detail) process-name>
<wide>
```

Syntax (EX Series Switches and MX Series Routers)

```
show system processes
<all-members>
<brief | detail | extensive | summary>
<health (pid process-identifer | process-name process-name)>
<local>
<member member-id>
<providers>
<resource-limits (brief | detail) process-name>
<wide>
```

Syntax (QFX Series Switches)

```
show system processes
<all-members>
<brief | detail | extensive | summary>
<health (pid process-identifer | process-name process-name)>
host-processes (brief|detail )
<local>
<member member-id>
<providers>
<resource-limits (brief | detail) process-name>
<wide>
```

Syntax (OCX Series)

```
show system processes
<brief | detail | extensive | summary >
<health (pid process-identifer | process-name process-name)>
host-processes (brief|detail )
<providers>
<resource-limits>
<wide>
```

Syntax (TX Matrix Routers)

```
show system processes
<brief | detail | extensive | summary>
<all-chassis| all-lcc | lcc number | scc>
<wide>
```

Syntax (TX Matrix Plus Router)

```
show system processes
<brief | detail | extensive | summary>
<all-chassis| all-lcc | lcc number | sfc number>
<wide>
```

Syntax (Junos OS Evolved)

```
show system processes
<brief | detail | extensive | summary>
<node node-name>
<wide>
```

Description

Display information about software processes that are running on the router or switch and that have controlling terminals.

Options

none	Display standard information about system processes.
brief | detail | extensive | summary	(Optional) Display the specified level of detail.
adaptive-services	(Optional) Display the configuration management process that manages the configuration for stateful firewall, Network Address Translation (NAT), intrusion detection services (IDS), and IP Security (IPsec) services on the Adaptive Services PIC.
alarm-control	(Optional) Display the process to configure the system alarm.
all-chassis	(TX Matrix routers and TX Matrix Plus routers only) (Optional) Display standard system process information about all the T640 routers (in a routing matrix based on the TX Matrix router) or all the T1600 or T4000 routers (in a routing matrix based on the TX Matrix Plus router) in the chassis.
all-lcc	(TX Matrix routers and TX Matrix Plus router only) (Optional) Display standard system process information for all T640 routers (or line-card chassis) connected to the TX Matrix router. Display standard system process information for all connected T1600 or T4000 LCCs.
all-members	(EX4200 switches, QFX Series Virtual Chassis, and MX Series routers) (Optional) Display standard system process information for all members of the Virtual Chassis configuration.
ancpd-service	Display the Access Node Control Protocol (ANCP) process, which works with a special Internet Group Management Protocol (IGMP) session to collect outgoing interface mapping events in a scalable manner.
application-identification	Display the process that identifies an application using intrusion detection and prevention (IDP) to allow or deny traffic based on applications running on standard or nonstandard ports.
audit-process	(Optional) Display the RADIUS accounting process.
auto-configuration	Display the Interface Auto-Configuration process.
bootp	Display the process that enables a router, switch, or interface to act as a Dynamic Host Configuration Protocol (DHCP) or bootstrap protocol (BOOTP) relay agent. DHCP relaying is disabled.

captive-portal-content-delivery	Display the HTTP redirect service by specifying the location to which a subscriber's initial Web browser session is redirected, enabling initial provisioning and service selection for the subscriber.
ce-l2tp-service	(Optional) (M10, M10i, M7i, and MX Series routers only) Display the Universal Edge Layer 2 Tunneling Protocol (L2TP) process, which establishes L2TP tunnels and Point-to-Point Protocol (PPP) sessions through L2TP tunnels.
cfm	Display Ethernet Operations, Administration, and Maintenance (OAM) connectivity fault management (CFM) process, which can be used to monitor the physical link between two switches.
chassis-control	(Optional) Display the chassis management process.
class-of-service	(Optional) Display the class-of-service (CoS) process, which controls the router's or switch’s CoS configuration.
clksyncd-service	Display the external clock synchronization process, which uses synchronous Ethernet (SyncE).
craft-control	Display the process for the I/O of the craft interface.
database-replication	(EX Series switches and MX Series routers only) (Optional) Display the database replication process.
datapath-trace-service	Display the packet path tracing process.
dhcp-service	(EX Series switches and MX Series routers only) (Optional) Display the Dynamic Host Configuration Protocol process, which enables a DHCP server to allocate network IP addresses and deliver configuration settings to client hosts without user intervention.
diameter-service	(Optional) Display the diameter process.
disk-monitoring	(Optional) Display the disk monitoring process, which checks the health of the hard disk drive on the Routing Engine.
dynamic-flow-capture	(Optional) Display the dynamic flow capture (DFC) process, which controls DFC configurations on Monitoring Services III PICs.
ecc-error-logging	(Optional) Display the error checking and correction (ECC) process, which logs ECC parity errors in memory on the Routing Engine.

ethernet-connectivity-fault-management	Display the process that provides IEEE 802.1ag OAM connectivity fault management (CFM) database information for CFM maintenance association end points (MEPs) in a CFM session.
ethernet-link-fault-management	(EX Series switches and MX Series routers only) (Optional) Display the process that provides the OAM link fault management (LFM) information for Ethernet interfaces.
event-processing	(Optional) Display the event process (eventd).
firewall	(Optional) Display the firewall management process, which manages the firewall configuration and enables accepting or rejecting packets that are transiting an interface on a router or switch.
general-authentication-service	(EX Series switches and MX Series routers only) (Optional) Display the general authentication process.
health (pid *process-identifer* **| process-name** *process-name***)**	(Optional) Display process health information, either by process id (PID) or by process name.
host-processes	Display process information of processes running on the host system. (On OCX Series only) The following options are available: • brief | detail—(Optional) Display the specified level of detail.
iccp-service	Display the Inter-Chassis Communication Protocol (ICCP) process.
idp-policy	Display the intrusion detection and prevention (IDP) protocol process.
ilmi	Display the Integrated Local Management Interface (ILMI) protocol process, which provides bidirectional exchange of management information between two ATM interfaces across a physical connection.
inet-process	Display the IP multicast family process.
init	Display the process that initializes the USB modem.
interface-control	(Optional) Display the interface process, which controls the router's or switch's physical interface devices and logical interfaces.
kernel-replication	(Optional) Display the kernel replication process, which replicates the state of the backup Routing Engine when graceful Routing Engine switchover (GRES) is configured.

l2-learning	(Optional) Display the Layer 2 address flooding and learning process.
l2cpd-service	Display the Layer 2 Control Protocol process, which enables features such as Layer 2 protocol tunneling and nonstop bridging.
lacp	(Optional) Display the Link Aggregation Control Protocol (LACP)process. LACP provides a standardized means for exchanging information between partner systems on a link to allow their link aggregation control instances to reach agreement on the identity of the LAG to which the link belongs, and then to move the link to that LAG, and to enable the transmission and reception processes for the link to function in an orderly manner.
lcc *number*	(TX Matrix routers and TX Matrix Plus routers only) (Optional) On a TX Matrix router, display standard system process information for a specific T640 router that is connected to the TX Matrix router. On a TX Matrix Plus router, display standard system process information for a specific router that is connected to the TX Matrix Plus router. Replace *number* with the following values depending on the LCC configuration: • 0 through 3, when T640 routers are connected to a TX Matrix router in a routing matrix. • 0 through 3, when T1600 routers are connected to a TX Matrix Plus router in a routing matrix. • 0 through 7, when T1600 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix. • 0, 2, 4, or 6, when T4000 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.
local	(EX4200 switches, QFX Series Virtual Chassis, and MX Series routers) (Optional) Display standard system process information for the local Virtual Chassis member.
local-policy-decision-function	Display the process for the Local Policy Decision Function, which regulates collection of statistics related to applications and application groups and tracking of information about dynamic subscribers and static interfaces.
logical-system-mux	Display the logical router multiplexer process (lrmuxd), which manages the multiple instances of the routing protocols process (rpd) on a machine running logical routers.

mac-validation	Display the MAC validation process, which configures MAC address validation for subscriber interfaces created on demux interfaces in dynamic profiles on MX Series routers.
member *member-id*	(EX4200 switches, QFX Series Virtual Chassis, and MX Series routers) (Optional) Display standard system process information for the specified member of the Virtual Chassis configuration. For EX4200 switches, replace *member-id* with a value from 0 through 9. For an MX Series Virtual Chassis, replace *member-id* with a value of 0 or 1.
mib-process	(Optional) Display the MIB II process, which provides the router's MIB II agent.
mobile-ip	(Optional) Display the Mobile IP process, which configures Junos OS Mobile IP features.
mountd-service	(EX Series switches and MX Series routers only) (Optional) Display the service for NFS mounts requests.
mpls-traceroute	(Optional) Display the MPLS Periodic Traceroute process.
mspd	(Optional) Display the Multiservice process.
multicast-snooping	(EX Series switches and MX Series routers only) (Optional) Display the multicast snooping process, which makes Layer 2 devices such as VLAN switches aware of Layer 3 information, such as the media access control (MAC) addresses of members of a multicast group.
named-service	(Optional) Display the DNS Server process, which is used by a router or a switch to resolve hostnames into addresses.
neighbor-liveness	Display the process, which specifies the maximum length of time that the router waits for its neighbor to re-establish an LDP session.
nfsd-service	(Optional) Display the Remote NFS Server process, which provides remote file access for applications that need NFS-based transport.
ntp	Display the Network Time Protocol (NTP) process, which provides the mechanisms to synchronize time and coordinate time distribution in a large, diverse network.
packet-triggered-subscribers	Display the packet-triggered subcribers and policy control (PTSP) process, which allows the application of policies to dynamic subscribers that are controlled by a subscriber termination device.

peer-selection-service	(Optional) Display the Peer Selection Service process.
periodic-packet-services	Display the Periodic packet management process, which is responsible for processing a variety of time-sensitive periodic tasks so that other processes can more optimally direct their resources.
pfe	Display the Packet Forwarding Engine management process.
pgcp-service	(Optional) Display the pgcpd service process running on the Routing Engine.
pgm	Display the Pragmatic General Multicast (PGM) protocol process, which enables a reliable transport layer for multicast applications.
pic-services-logging	(Optional) Display the logging process for some PICs. With this process, also known as fsad (the file system access daemon), PICs send special logging information to the Routing Engine for archiving on the hard disk.
ppp	(Optional) Display the Point-to-Point Protocol (PPP) process, which is the encapsulation protocol process for transporting IP traffic across point-to-point links.
ppp-service	Display the Universal edge PPP process, which is the encapsulation protocol process for transporting IP traffic across universal edge routers.
pppoe	(Optional) Display the Point-to-Point Protocol over Ethernet (PPPoE) process, which combines PPP that typically runs over broadband connections with the Ethernet link-layer protocol that allows users to connect to a network of hosts over a bridge or access concentrator.
process-monitor	Display the process health monitor process (pmond).
providers	(Optional) Display provider processes.
redundancy-interface-process	(Optional) Display the ASP redundancy process.
remote-operations	(Optional) Display the remote operations process, which provides the ping and traceroute MIBs.
resource-cleanup	Display the resource cleanup process.
resource-limits (brief | detail) *process-name*	(Optional) Display process resource limits.
routing	(Optional) Display the routing protocol process.

sampling	(Optional) Display the sampling process, which performs packet sampling based on particular input interfaces and various fields in the packet header.
sbc-configuration-process	Display the session border controller (SBC) process of the border signaling gateway (BSG).
scc	(TX Matrix routers only) (Optional) Display standard system process information for the TX Matrix router (or switch-card chassis).
sdk-service	Display the SDK Service process, which runs on the Routing Engine and is responsible for communications between the SDK application and Junos OS. Although the SDK Service process is present on the router, it is turned off by default.
secure-neighbor-discovery	(EX Series switches and MX Series routers only) (Optional) Display the secure Neighbor Discovery Protocol (NDP) process, which provides support for protecting NDP messages.
send	(Optional) Display the Secure Neighbor Discovery Protocol (SEND) process, which provides support for protecting Neighbor Discovery Protocol (NDP) messages.
service-deployment	(Optional) Display the service deployment process, which enables Junos OS to work with the Session and Resource Control (SRC) software.
sfc *number*	(TX Matrix Plus routers only) (Optional) Display system process information for the TX Matrix Plus router. Replace *number* with 0.
snmp	Display the SNMP process, which enables the monitoring of network devices from a central location and provides the router's or switch's SNMP primary agent.
sonet-aps	Display the SONET Automatic Protection Switching (APS) process, which monitors any SONET interface that participates in APS.
static-subscribers	(Optional) Display the Static subscribers process, which associates subscribers with statically configured interfaces and provides dynamic service activation and activation for these subscribers.
tunnel-oamd	(Optional) Display the Tunnel OAM process, which enables the Operations, Administration, and Maintenance of Layer 2 tunneled networks. Layer 2 protocol tunneling (L2PT) allows service providers to send Layer 2 protocol data units (PDUs) across the provider's cloud and deliver them to Juniper Networks EX Series Ethernet Switches that are not part of the local broadcast domain.

vrrp	(EX Series switches and MX Series routers only) (Optional) Display the Virtual Router Redundancy Protocol (VRRP) process, which enables hosts on a LAN to make use of redundant routing platforms on that LAN without requiring more than the static configuration of a single default route on the hosts.
watchdog	Display the watchdog timer process, which enables the watchdog timer when Junos OS encounters a problem.
wide	(Optional) Display process information that might be wider than 80 columns.
node *node-name*	Specify a name if you want to view the system process details for that node. Example: `re0`.

Additional Information

By default, when you issue the `show system processes` command on the primary Routing Engine of a TX Matrix router or a TX Matrix Plus router, the command is broadcast to all the primary Routing Engines of the LCCs connected to it in the routing matrix. Likewise, if you issue the same command on the backup Routing Engine of a TX Matrix or a TX Matrix Plus router, the command is broadcast to all backup Routing Engines of the LCCs that are connected to it in the routing matrix.

Required Privilege Level

view

Output Fields

The following table describes the output fields for the `show system processes` command. Output fields are listed in the approximate order in which they appear.

Table 13: show system processes Output Fields

Field Name	Field Description	Level of Output
`last pid`	Last process identifier assigned to the process.	`brief extensive summary`
`load averages`	Three load averages followed by the current time.	`brief extensive summary`

Table 13: show system processes Output Fields *(Continued)*

Field Name	Field Description	Level of Output
processes	Number of existing processes and the number of processes in each state (sleeping, running, starting, zombies, and stopped).	brief extensive summary
CPU	(For systems running Junos OS with upgraded FreeBSD only) Breakdown of the percent usage on a per-CPU basis into the following categories: % user, % nice, % system, % interrupt, % idle. **NOTE**: This field shows up in the second frame of output. To see which platforms run Junos OS with upgraded FreeBSD, see Release Information for Junos OS with Upgraded FreeBSD. **NOTE**: On ACX Series routers running Junos OS Evolved, the show system process command might report CPU utilization spikes greater than 100%. This kind of CPU utilization is normal behavior, and no user action is required. The CPU utilization spikes represent the sum of individual processor threads and not of the entire system CPU capacity.	extensive
Mem	Information about physical and virtual memory allocation.	brief extensive summary

Table 13: show system processes Output Fields *(Continued)*

Field Name	Field Description	Level of Output
Active	Memory allocated and actively used by the program. When the system is under memory pressure, the pageout process reuses memory from the free, cache, inact and, if necessary, active pages. When the pageout process runs, it scans memory to see which pages are good candidates to be unmapped and freed up. Thus, the distinction between Active and Inact memory is only used by the pageout process to determine which pool of pages to free first at the time of a memory shortage. The pageout process first scans the Inact list, and checks whether the pages on this list have been accessed since the time they have been listed here. The pages that have been accessed are moved from the Inact list to the Active list. On the other hand, pages that have not been accessed become prime candidates to be freed by the pageout process. If the pageout process cannot produce enough free pages from the Inact list, pages from the Active list get freed up. Because the pageout process runs only when the system is under memory pressure, the pages on the Inact list remain untouched – even if they have not been accessed recently – when the amount of Free memory is adequate.	brief extensive summary
Inact	Memory allocated but not recently used or memory freed by the programs. Inactive memory remains mapped in the address space of one or more processes and, therefore, counts toward the RSS value of those processes. Any amount of memory freed by the routing protocol process might still be considered part of the RES value. Generally, the kernel delays the migrating of memory out of the Inact queue into the Cache or Free list unless there is a memory shortage.	brief extensive summary
Wired	Memory that is not eligible to be swapped, usually used for in-kernel memory structures and/or memory physically locked by a process.	brief extensive summary
Cache	Memory that is not associated with any program and does not need to be swapped before being reused.	brief extensive summary

Table 13: show system processes Output Fields *(Continued)*

Field Name	Field Description	Level of Output
Buf	Size of memory buffer used to hold data recently called from the disk.	brief extensive summary
Free	Memory that is not associated with any programs. Memory freed by a process can become Inactive, Cache, or Free, depending on the method used by the process to free the memory.	brief extensive summary
Swap	Information about physical and virtual memory allocation. **NOTE**: Memory can remain swapped out indefinitely if it is not accessed again. Therefore, the show system process extensive command shows that memory is swapped to disk even though there is plenty of free memory, and such a situation is not unusual.	brief extensive summary
PID	Process identifier.	detail extensive summary
TT	Control terminal name.	none detail

Table 13: show system processes Output Fields *(Continued)*

Field Name	Field Description	Level of Output
STAT	Symbolic process state. The state is given by a sequence of letters. The first letter indicates the run state of the process: • D—In disk or other short-term, uninterruptible wait • I—Idle (sleeping longer than about 20 seconds) • R—Runnable • S—Sleeping for less than 20 seconds • T—Stopped • Z—Dead (zombie) • + —The process is in the foreground process group of its control terminal. • <—The process has raised CPU scheduling priority. • >—The process has specified a soft limit on memory requirements and is currently exceeding that limit; such a process is not swapped. • A—The process requested random page replacement. • E—The process is trying to exit. • L—The process has pages locked in core. • N—The process has reduced CPU scheduling priority. • S—The process requested first-in, first-out (FIFO) page replacement. • s—The process is a session leader. • V—The process is temporarily suspended. • W—The process is swapped out. • X—The process is being traced or debugged.	none detail
UID	User identifier.	detail

Table 13: show system processes Output Fields *(Continued)*

Field Name	Field Description	Level of Output
USERNAME	Process owner.	extensive summary
PPID	Parent process identifier.	detail
CPU	**(D)** Short-term CPU usage. **(E and S)** Raw (unweighted) CPU usage. The value of this field is used to sort the processes in the output.	detail extensive summary
RSS	Resident set size.	detail
WCHAN	Symbolic name of the wait channel.	detail
STARTED	Local time when the process started running.	detail
PRI	Current priority of the process. A lower number indicates a higher priority.	detail extensive summary
NI or NICE	UNIX "niceness" value. A lower number indicates a higher priority.	detail extensive summary
SIZE	Total size of the process (text, data, and stack), in kilobytes.	extensive summary
RES	Current amount of program resident memory, in kilobytes. This is also known as RSS or Resident Set Size. The RES value includes shared library pages used by the process. Any amount of memory freed by the process might still be considered part of the RES value. Generally, the kernel delays the migrating of memory out of the Inact queue into the Cache or Free list unless there is a memory shortage. This can lead to large discrepancies between the values reported by the routing protocol process and the kernel, even after the routing protocol process has freed a large amount of memory.	extensive summary

Table 13: show system processes Output Fields *(Continued)*

Field Name	Field Description	Level of Output
STATE	Current state of the process (for example, sleep, wait, run, idle, zombie, or stop).	extensive summary
C	CPU number. **NOTE**: There is no such column in output from Junos OS Evolved. To see the CPU number, issue the show system processes wide | detail command and look at the PSR column.	extensive summary
TIME	**(S)** Number of system and user CPU seconds that the process has used. **(None, D, and E)** Total amount of time that the command has been running.	detail extensive summary
WCPU	Weighted CPU usage.	extensive summary
COMMAND	Command that is currently running. (MX Series routers only) When you display the software processes for an MX Series Virtual Chassis, the show system processes command does not display information about the relayd process.	detail extensive summary
THR	Number of threads in the process	extensive

Sample Output

show system processes

```
user@host> show system processes
PID  TT  STAT      TIME COMMAND
    0  ??  DLs    0:00.70  (swapper)
    1  ??  Is     0:00.35 /sbin/init --
    2  ??  DL     0:00.00  (pagedaemon)
```

```
    3  ??  DL     0:00.00  (vmdaemon)
    4  ??  DL     0:42.37  (update)
    5  ??  DL     0:00.00  (if_jnx)
   80  ??  Ss     0:14.66 syslogd -s
   96  ??  Is     0:00.01 portmap
  128  ??  Is     0:02.70 cron
  173  ??  Is     0:02.24 /usr/local/sbin/sshd (sshd1)
  189  ??  S      0:03.80 /sbin/watchdog -t180
  190  ??  I      0:00.03 /usr/sbin/tnetd -N
  191  ??  S      2:24.76 /sbin/ifd -N
  192  ??  S<     0:55.44 /usr/sbin/xntpd -N
  195  ??  S      0:53.11 /usr/sbin/snmpd -N
  196  ??  S      1:15.73 /usr/sbin/mib2d -N
  198  ??  I      0:00.75 /usr/sbin/inetd -N
 2677  ??  I      0:00.01 /usr/sbin/mgd -N
 2712  ??  Ss     0:00.24 rlogind
 2735  ??  R      0:00.00 /bin/ps -ax
 1985  p0- S      0:07.41 ./rpd -N
 2713  p0  Is     0:00.24 -tcsh (tcsh)
 2726  p0  S+     0:00.07 cli
```

show system processes brief

```
user@host> show system processes brief
last pid:   543;  load averages:  0.00,  0.00,  0.00    18:29:47
37 processes:  1 running, 36 sleeping

Mem: 25M Active, 3976K Inact, 19M Wired, 8346K Buf, 202M Free
Swap: 528M Total, 64K Used, 528M Free
```

show system processes detail

```
user@host> show system processes detail
  PID   UID  PPID CPU PRI  NI    RSS WCHAN    STARTED TT  STAT        TIME COMMAND
   11     0     0   0 155   0     64 -        Wed16    -  RL    6411:48.16 [idle]
17967     0 17936   0  24   0  96976 select   Wed16    -  S      138:17.79 /usr/sbin/chassisd -N
    0     0     0   0 -16   0    384 swapin   Wed16    -  DLs      0:22.33 [kernel]
    1     0     0   0  20   0    600 wait     Wed16    -  ILs      0:00.11 /sbin/init --
    2     0     0   0 -16   0     16 jfe_job_ Wed16    -  DL       0:30.05 [jfe_job_0_0]
    3     0     0   0 -16   0     16 jfe_job_ Wed16    -  DL       0:00.00 [jfe_job_1_0]
```

```
    4     0     0   0 -16   0     16 jfe_job_ Wed16    -  DL       0:00.00 [jfe_job_1_1]
    5     0     0   0 -16   0     16 jfe_job_ Wed16    -  DL       0:00.00 [jfe_job_1_2]
    6     0     0   0 -16   0     16 jfe_job_ Wed16    -  DL       0:00.00 [jfe_job_1_3]
    7     0     0   0 -16   0     16 jfe_job_ Wed16    -  DL       0:00.00 [jfe_job_2_0]
    8     0     0   0 -16   0     16 jfe_job_ Wed16    -  DL       0:00.00 [jfe_job_3_0]
    9     0     0   0 -16   0     16 jfe_job_ Wed16    -  DL       0:00.00 [jfe_job_3_1]
   10     0     0   0 -16   0     16 audit_wo Wed16    -  DL       0:00.00 [audit]
   12     0     0   0 -16   0     16 jfe_job_ Wed16    -  DL       0:00.00 [jfe_job_3_2]
   13     0     0   0 -16   0     16 jfe_job_ Wed16    -  DL       0:00.00 [jfe_job_3_3]
   14     0     0   0 -16   0     16 jfe_job_ Wed16    -  DL       0:00.00 [jfe_job_4_0]
   15     0     0   0 -16   0     16 jfe_job_ Wed16    -  DL       0:00.00 [jfe_job_4_1]
   16     0     0   0 -16   0     16 jfe_job_ Wed16    -  DL       0:00.00 [jfe_job_4_2]
   17     0     0   0 -16   0     16 jfe_job_ Wed16    -  DL       0:00.92 [jfe_job_4_3]
   18     0     0   0 -64   0    656 -        Wed16    -  WL       4:47.14 [intr]
   19     0     0   0  -8   0     48 -        Wed16    -  DL       0:02.31 [geom]
   20     0     0   0 -16   0     16 crypto_w Wed16    -  DL       0:00.00 [crypto]
   21     0     0   0 -16   0     16 crypto_r Wed16    -  DL       0:00.00 [crypto returns]
   22     0     0   0 -16   0     32 -        Wed16    -  DL       0:00.01 [cam]
```

show system processes extensive

```
user@host> show system processes extensive
Mem: 241M Active, 99M Inact, 78M Wired, 325M Cache, 69M Buf, 1251M Free
Swap: 2048M Total, 2048M Free


  PID USERNAME  THR PRI NICE   SIZE    RES STATE    TIME   WCPU COMMAND
   11 root        1 171   52     0K    12K RUN    807.5H 98.73% idle
   13 root        1 -20 -139     0K    12K WAIT    36:17  0.00% swi7: clock sio
 1499 root        1  96    0  7212K  3040K select  34:01  0.00% license-check
 1621 root        1  96    0 20968K 11216K select  20:25  0.00% mib2d
 1465 root        2   8  -88   115M 11748K nanslp  14:32  0.00% chassisd
 1478 root        1  96    0  6336K  3816K select  11:28  0.00% ppmd
   20 root        1 -68 -187     0K    12K WAIT    10:28  0.00% irq10: em0 em1+++*
 1490 root        1  96    0 11792K  4336K select   9:44  0.00% shm-rtsdbd
 1618 root        1  96    0 39584K  7464K select   8:47  0.00% pfed
 1622 root        1  96    0 15268K 10988K select   6:16  0.00% snmpd
 1466 root        1  96    0  7408K  2896K select   5:44  0.00% alarmd
    7 root        1 -16    0     0K    12K client   5:09  0.00% ifstate notify
 1480 root        1  96    0  5388K  2660K select   4:29  0.00% ksyncd
   12 root        1 -40 -159     0K    12K WAIT     4:15  0.00% swi2: netisr 0
```

```
 1462 root        1  96    0  1836K  1240K select   3:57  0.00% bslockd
   55 root        1 -16    0     0K    12K -        3:44  0.00% schedcpu
 1392 root        1  16    0     0K    12K bcmsem   3:37  0.00% bcmLINK.0
   47 root        1 -16    0     0K    12K psleep   3:25  0.00% vmkmemdaemon
   36 root        1  20    0     0K    12K syncer   2:46  0.00% syncer
 1484 root        1  96    0  7484K  3428K select   2:38  0.00% clksyncd
 1616 root        1  96    0  4848K  2848K select   2:18  0.00% irsd
 1487 root        1  96    0 32800K  6992K select   2:10  0.00% smid
 1623 root        1  96    0 34616K  5464K select   2:01  0.00% dcd
   15 root        1 -16    0     0K    12K -        1:59  0.00% yarrow
   49 root        1 -16    0     0K    12K .        1:51  0.00% ddostasks
```

Release Information

Command introduced before Junos OS Release 7.4.

Option `sfc` introduced for the TX Matrix Plus router in Junos OS Release 9.6.

Enhanced output regarding per CPU usage introduced in Junos OS Release 16.1R3 for Junos OS with upgraded FreeBSD.

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Routing Matrix with a TX Matrix Plus Router Solutions Page

show system queues

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Syntax

```
show system queues
```

Syntax (TX Matrix Router)

```
show system queues
<all-chassis| all-lcc | lcc number | scc>
```

Syntax (TX Matrix Plus Router)

```
show system queues
<all-chassis | all-lcc | lcc number | sfc number>
```

Syntax (MX Series Router)

```
show system queues
<all-members>
<local>
<member member-id>
```

Description

Display queue statistics.

Options

all-chassis (TX Matrix routers and TX Matrix Plus routers only) (Optional) On a TX Matrix router, display system queue statistics for all the T640 routers in the chassis that are connected to the TX Matrix router. On a TX Matrix Plus router, display system queue statistics for all the T1600 or T4000 routers in the chassis that are connected the TX Matrix Plus router.

all-lcc (TX Matrix routers and TX Matrix Plus routers only) (Optional) Display system queue statistics for all LCC chassis attached to the TX Matrix or TX Matrix Plus router.

all-members (MX Series routers only) (Optional) Display system queue statistics for all members of the Virtual Chassis configuration.

lcc *number* (TX Matrix routers and TX Matrix Plus routers only) (Optional) On a TX Matrix router, display system queue statistics for a specific T640 router that is connected to the TX Matrix router. On a TX Matrix Plus router, display system queue statistics for a specific connected router that is connected to the TX Matrix Plus router.

Replace *number* with the following values depending on the LCC configuration:

- 0 through 3, when T640 routers are connected to a TX Matrix router in a routing matrix.
- 0 through 3, when T1600 routers are connected to a TX Matrix Plus router in a routing matrix.
- 0 through 7, when T1600 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.
- 0, 2, 4, or 6, when T4000 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.

local (MX Series routers only) (Optional) Display system queue statistics for the local Virtual Chassis member.

member *member-id* (MX Series routers only) (Optional) Display system queue statistics for the specified member of the Virtual Chassis configuration. Replace *member-id* with a value of 0 or 1.

scc (TX Matrix routers only) (Optional) Display queue statistics for the TX Matrix router.

sfc *number* (TX Matrix Plus routers only) (Optional) Display system queue statistics for the TX Matrix Plus router. Replace *number* with 0.

Additional Information

By default, when you issue the `show system queues` command on the primary Routing Engine of a TX Matrix router or a TX Matrix Plus router, the command is broadcast to all the primary Routing Engines of the LCCs connected to it in the routing matrix. Likewise, if you issue the same command on the backup Routing Engine of a TX Matrix or a TX Matrix Plus router, the command is broadcast to all backup Routing Engines of the LCCs that are connected to it in the routing matrix.

Required Privilege Level

maintenance

Output Fields

Table 14 on page 336 lists the output fields for the `show system queues` command. Output fields are listed in the approximate order in which they appear.

Table 14: show system queues Output Fields

Field Name	Field Description
`Output interface`	Interface on the device on which the queue exists: • `fxp0`—Management Ethernet interface. • `fxp1`—Internal Ethernet interface. • `ipip, lsi, tap, mt, mtun, pimd, and pime`—Internally generated interface and not configurable. • `dsc`—Discard interface. • `em`—Management and internal Ethernet interfaces. • `gre`—Internally generated interface that is configurable only as the control channel for Generalized MPLS (GMPLS). • `ge`—Gigabit Ethernet interface. • `xe`—10-Gigabit Ethernet interface. • `lo`—Loopback interface; the Junos OS automatically configures one loopback interface (lo0). • `lsq`—Link services IQ interface. • `lt`—Logical tunnel interface. • `gr, ip, sp`—Services interfaces. • `irb`—integrated routing and bridging interface. • `vtep`—Virtual Tunnel End Point (VTEP). • `ppd and ppe`—Interfaces used to enable a cluster to act as a rendezvous point (RP) or first hop router in the multicast domain.
`bytes`	Number of bytes in the queue.
`max`	Maximum number of bytes allowed in the queue.
`packets`	Number of packets in the queue.

Table 14: show system queues Output Fields *(Continued)*

Field Name	Field Description
max	Maximum number of packets allowed in the queue.
drops	Number of packets dropped from the queue.

Sample Output

show system queues

```
user@host> show system queues
output interface            bytes          max  packets      max    drops
fxp0                            0      1250000        0     4166        6
fxp1                            0      1250000        0     4166       19
lsi                             0        12500        0       41        0
dsc                             0            0        0        0        0
```

Release Information

Command introduced before Junos OS Release 7.4.

sfc option introduced for the TX Matrix Plus router in Junos OS Release 9.6.

RELATED DOCUMENTATION

Routing Matrix with a TX Matrix Plus Router Solutions Page

show system reboot

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Syntax

```
show system reboot
<both-routing-engines>
```

Syntax (EX Series and MX Series)

```
show system reboot
<all-members>
<both-routing-engines>
<local>
<member member-id>
```

Syntax (TX Matrix Router)

```
show system reboot
<all-chassis | all-lcc | lcc number / scc>
<both-routing-engines>
```

Syntax (TX Matrix Plus Router)

```
show system reboot
<all-chassis| all-lcc | lcc number /  sfc number>
<both-routing-engines>
```

Syntax (QFX Series and OCX Series)

```
show system reboot
<both-routing-engines>
<infrastructure name>
<interconnect-device name>
<node-device name>
```

Syntax (Junos OS Evolved)

```
show system reboot
```

Description

Display pending system reboots or halts.

Options

none Display pending reboots or halts on the active Routing Engine.

For Junos OS Evolved, the `show system reboot` command is applicable to all nodes (Routing Engines and FPCs). There is no system reboot command for a specific

Routing Engine. Hence, the `show system reboot` command shows the pending reboot for the system and not for a specific Routing Engine.

all-chassis (TX Matrix routers and TX Matrix Plus routers only) (Optional) On a TX Matrix router, display halt or reboot request information for all the T640 routers in the chassis that are connected to the TX Matrix router. On a TX Matrix router, display halt or reboot request information for all the T1600 or T4000 routers in the chassis that are connected to the TX Matrix Plus router.

all-members (EX4200 switches and MX Series routers only) (Optional) Display halt or reboot request information for all members of the Virtual Chassis configuration.

all-lcc (TX Matrix routers and TX Matrix Plus router only) (Optional) On a TX Matrix router, display system halt or reboot request information for all T640 routers connected to the TX Matrix router. On a TX Matrix Plus router, display halt or reboot request information for all connected T1600 or T4000 LCCs.

both-routing-engines (Systems with multiple Routing Engines) (Optional) Display halt or reboot request information on both Routing Engines.

> **NOTE**: Junos OS Evolved does not support the both-routing-engines option.

infrastructure *name* (QFabric systems only) (Optional) Display reboot request information on the fabric manager Routing Engines and fabric control Routing Engines.

interconnect-device *name* (QFabric systems only) (Optional) Display reboot request information on the Interconnect device.

lcc *number* (TX Matrix routers and TX Matrix Plus routers only) (Optional) On a TX Matrix router, display halt or reboot request information for a specific T640 router that is connected to the TX Matrix router. On a TX Matrix Plus router, display halt or reboot request information for a specific router that is connected to the TX Matrix Plus router.

Replace *number* with the following values depending on the LCC configuration:

- 0 through 3, when T640 routers are connected to a TX Matrix router in a routing matrix.
- 0 through 3, when T1600 routers are connected to a TX Matrix Plus router in a routing matrix.

- 0 through 7, when T1600 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.
- 0, 2, 4, or 6, when T4000 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.

local — (EX4200 switches and MX Series routers only) (Optional) Display halt or reboot request information for the local Virtual Chassis member.

member *member-id* — (EX4200 switches and MX Series routers only) (Optional) Display halt or reboot request information for the specified member of the Virtual Chassis configuration. For EX4200 switches, replace *member-id* with a value from 0 through 9. For an MX Series Virtual Chassis, replace *member-id* with a value of 0 or 1.

node-group *name* — (QFabric systems only) (Optional) Display reboot request information on the Node group.

scc — (TX Matrix router only) (Optional) Display halt or reboot request information for the TX Matrix router (or switch-card chassis).

sfc — (TX Matrix Plus router only) (Optional) Display halt or reboot request information for the TX Matrix Plus router.

Additional Information

By default, when you issue the `show system reboot` command on a TX Matrix or TX Matrix Plus primary Routing Engine, the command is broadcast to all the T640 (in a routing matrix based on the TX Matrix router) or T1600 (in a routing matrix based on the TX Matrix Plus router) primary Routing Engines connected to it. Likewise, if you issue the same command on the TX Matrix or TX Matrix Plus backup Routing Engine, the command is broadcast to all the T640 (in a routing matrix based on the TX Matrix router) or T1600 (in a routing matrix based on the TX Matrix Plus router) backup Routing Engines that are connected to it.

For Junos OS Evolved, the `show system reboot` command is applicable to all nodes (Routing Engines and FPCs). There is no system reboot command for a specific Routing Engine. Hence, the `show system reboot` command shows the pending reboot for the system and not for a specific Routing Engine.

Required Privilege Level

maintenance

Sample Output

show system reboot

```
user@host> show system reboot
reboot requested by root at Wed Feb 10 17:40:46 1999
[process id 17885]
```

show system reboot all-lcc (TX Matrix Router)

```
user@host> show system reboot all-lcc
lcc0-re0:
--------------------------------------------------------------------------
No shutdown/reboot scheduled.

lcc2-re0:
--------------------------------------------------------------------------
No shutdown/reboot scheduled.
```

show system reboot sfc (TX Matrix Plus Router)

```
user@host> show system sfc 0
No shutdown/reboot scheduled.
```

show system reboot (QFX3500 Switch)

```
user@switch> show system reboot
No shutdown/reboot scheduled.
```

Release Information

Command introduced before Junos OS Release 7.4.

`sfc` option introduced for the TX Matrix Plus router in Junos OS Release 9.6.

RELATED DOCUMENTATION

Routing Matrix with a TX Matrix Plus Router Solutions Page

show system snapshot (Junos OS)

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Syntax

```
show system snapshot
```

Syntax (EX Series Switches)

```
show system snapshot
<all-members | local | member member-id>
<media (external | internal)>
```

Description

This command displays information about the backup software:

- On the routers, this command display information about the backup software, which is located in the **/altroot**, and **/altconfig** file systems or on the alternate media.

- On the switches, this command display information about the backup of the root file system **(/)** and directories **/altroot**,**/config**, **/var**, and **/var/tmp**, which are located either on an external USB flash drive or in internal flash memory.

  To back up software, use the `request system snapshot` command.

Options

none — Display information about the backup software.

all-members | local | member *member-id* — (EX Series switch Virtual Chassis only) (Optional) Display the snapshot in a Virtual Chassis:

- all-members—Display the snapshot for all members of the Virtual Chassis.
- local—Display the snapshot on the member of the Virtual Chassis that you are currently logged into.
- member *member-id*—Display the snapshot for the specified member of the Virtual Chassis.

media (external | internal) — (EX Series switch only) (Optional) Display the destination media location for the snapshot. The `external` option specifies the snapshot on an external mass storage device, such as a USB flash drive. The `internal` option specifies the snapshot on an internal memory source, such as internal flash memory. If no additional options are specified, the command displays the snapshot stored in both slices.

Required Privilege Level

view

Output Fields

Table 15 on page 344 lists the output fields for the `show system snapshot` command. Output fields are listed in the approximate order in which they appear.

Table 15: show system snapshot Output Fields

Field Name	Field Description
`Creation date`	Date and time of the last snapshot.

Table 15: show system snapshot Output Fields *(Continued)*

Field Name	Field Description
JUNOS version on snapshot	Junos OS release number of individual software packages.

Sample Output

show system snapshot (Router)

```
user@host> show system snapshot
Information for snapshot on hard-disk
Creation date: Oct 5 13:53:29 2005
JUNOS version on snapshot:
  jbase  : 7.3R2.5
  jcrypto: 7.3R2.5
  jdocs  : 7.3R2.5
  jkernel: 7.3R2.5
  jpfe   : M40-7.3R2.5
  jroute : 7.3R2.5
```

show system snapshot media external (Switch)

```
user@switch> show system snapshot media external
Information for snapshot on       external (/dev/da1s1a) (backup)
Creation date: Mar 19 03:37:18 2012
JUNOS version on snapshot:
  jbase  : ex-12.1I20120111_0048_user
  jcrypto-ex: 12.1I20120111_0048_user
  jdocs-ex: 12.1I20120111_0048_user
  jroute-ex: 12.1I20120111_0048_user
  jswitch-ex: 12.1I20120111_0048_user
  jweb-ex: 12.1I20120111_0048_user
Information for snapshot on       external (/dev/da1s2a) (primary)
Creation date: Mar 19 03:38:25 2012
JUNOS version on snapshot:
  jbase  : ex-12.2I20120305_2240_user
```

```
  jcrypto-ex: 12.2I20120305_2240_user
  jdocs-ex: 12.2I20120305_2240_user
  jroute-ex: 12.2I20120305_2240_user
  jswitch-ex: 12.2I20120305_2240_user
  jweb-ex: 12.2I20120305_2240_user
```

show system snapshot media internal (Switch)

```
user@switch> show system snapshot media internal
Information for snapshot on internal (/dev/da0s1a) (backup)
Creation date: Mar 14 05:01:02 2011
JUNOS version on snapshot:
  jbase  : 11.1R1.9
  jcrypto-ex: 11.1R1.9
  jdocs-ex: 11.1R1.9
  jkernel-ex: 11.1R1.9
  jroute-ex: 11.1R1.9
  jswitch-ex: 11.1R1.9
  jweb-ex: 11.1R1.9
  jpfe-ex42x: 11.1R1.9
Information for snapshot on internal (/dev/da0s2a) (primary)
Creation date: Mar 30 08:46:27 2011
JUNOS version on snapshot:
  jbase  : 11.2-20110330.0
  jcrypto-ex: 11.2-20110330.0
  jdocs-ex: 11.2-20110330.0
  jkernel-ex: 11.2-20110330.0
  jroute-ex: 11.2-20110330.0
  jswitch-ex: 11.2-20110330.0
  jweb-ex: 11.2-20110330.0
  jpfe-ex42x: 11.2-20110330.0
```

Release Information

Command introduced in Junos OS Release 7.6.

Option `slice` deprecated for Junos OS with Upgraded FreeBSD in Junos OS Release 15.1. You can find which platforms run Junos OS with Upgraded FreeBSD here: Release Information for Junos OS with Upgraded FreeBSD.

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show system software

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Syntax

```
show system software
<detail>
```

Syntax (EX Series Switches)

```
show system software
<all-members>
<detail>
```

```
<local>
<member member-id>
```

Syntax (TX Matrix Router)

```
show system software
<all-chassis | all-lcc | lcc number | scc>
<detail>
```

Syntax (TX Matrix Plus Router)

```
show system software
<all-chassis | all-lcc | lcc number | sfc number>
<detail>
```

Syntax (QFX Series)

```
show system software
<detail>
<infrastructure name>
<interconnect-device name>
<node-group name>
```

Syntax (Junos OS Evolved)

```
show system software
<add-restart>
<list>
```

Description

Display the Junos OS extensions loaded on your router or switch.

Options

none	Display standard information about all loaded Junos OS extensions.
add-restart	(Junos OS Evolved only) (Optional) Display all console messages from the last in-service software upgrade (ISSU).
all-chassis	(TX Matrix routers and TX Matrix Plus routers only) (Optional) Display system software information for all the T640 routers (TX Matrix Router) or all the routers (TX Matrix Plus Router) in the chassis.
all-lcc	(TX Matrix routers and TX Matrix Plus routers only) (Optional) On a TX Matrix router, display system software information for all T640 routers connected to the TX Matrix router. On a TX Matrix Plus router, display system software information for all connected T1600 or T4000 LCCs.
all-members	(EX4200 switches only) (Optional) Display the system software running on all members of the Virtual Chassis configuration.
detail	(Optional) Display detailed information about available Junos OS extensions.
infrastructure *name*	(QFabric systems only) (Optional) Display the system software running on the fabric control Routing Engine and the fabric manager Routing Engine.
interconnect-device *name*	(QFabric systems only) (Optional) Display the system software running on the Interconnect device.
lcc *number*	(TX Matrix routers and TX Matrix Plus routers only) (Optional) On a TX Matrix router, display system software information for a specific T640 router that is connected to the TX Matrix router. On a TX Matrix Plus router, display system software information for a specific router that is connected to the TX Matrix Plus router. Replace *number* with the following values depending on the LCC configuration: • 0 through 3, when T640 routers are connected to a TX Matrix router in a routing matrix. • 0 through 3, when T1600 routers are connected to a TX Matrix Plus router in a routing matrix. • 0 through 7, when T1600 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.

- 0, 2, 4, or 6, when T4000 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.

local (EX4200 switches only) (Optional) Display the system software running on the local Virtual Chassis member.

member *member-id* (EX4200 switches only) (Optional) Display the system software running on the specified member of the Virtual Chassis configuration. Replace *member-id* with a value from 0 through 9.

node-group *name* (QFabric systems only) (Optional) Display the system software running on the Node group.

scc (Routing matrix only) (Optional) Display the system software running on a TX Matrix router (or switch-card chassis).

sfc (TX Matrix Plus routers only) (Optional) Display system software information for the TX Matrix Plus router.

Required Privilege Level

maintenance

Output Fields

When you enter this command, you are provided a list of Junos OS packages installed on the router and their corresponding Junos OS release number.

Sample Output

show system software

```
user@host> show system software
Information for jbase:

Comment:
JUNOS Base OS Software Suite [7.2R1.7]


Information for jcrypto:
```

```
Comment:
JUNOS Crypto Software Suite [7.2R1.7]
Information for jdocs:

Comment:
JUNOS Online Documentation [7.2R1.7]


Information for jkernel:

Comment:
JUNOS Kernel Software Suite [7.2R1.7]


Information for jpfe:

Comment:
JUNOS Packet Forwarding Engine Support (M20/M40) [7.2R1.7]


Information for jroute:

Comment:
JUNOS Routing Software Suite [7.2R1.7]


Information for junos:

Comment:
JUNOS Base OS boot [7.2R1.7]
```

Release Information

Command introduced before Junos OS Release 7.4.

`sfc` option introduced for the TX Matrix Plus router in Junos OS Release 9.6.

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show system statistics

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Syntax

```
show system statistics
```

Syntax (EX Series Switches)

```
show system statistics
<all-members>
<local>
<member member-id>
```

Syntax (TX Matrix Router)

```
show system statistics
<all-chassis | all-lcc | lcc number / scc>
```

Syntax (TX Matrix Plus Router)

```
show system statistics
<all-chassis | all-lcc | lcc number / sfc number>
```

Syntax (MX Series Router)

```
show system statistics
<all-members>
<local>
<member member-id>
<extended <ipv4 | ipv6>>
```

Syntax (QFX Series)

```
show system statistics
```

Description

Display system-wide protocol-related statistics.

Options

none Display system statistics for all the following protocols:

- arp—Address Resolution Protocol

- backup - Statistics of backup JunosVM or RE
- bridge—IEEE 802.1 Bridging
- clns—Connectionless Network Service
- esis—End System-to-Intermediate System
- ethoamcfm—Ethernet OAM protocol for connectivity fault management
- ethoamlfm—Ethernet OAM protocol for link fault management
- extended—System statistics for IPv4 and IPv6 traffic
- icmp—Internet Control Message Protocol
- icmp6—Internet Control Message Protocol version 6
- igmp—Internet Group Management Protocol
- ip—Internet Protocol version 4
- ip6—Internet Protocol version 6
- jsr—Juniper Socket Replication
- jtd - Show jtd statistics
- mpls—Multiprotocol Label Switching
- rdp—Reliable Datagram Protocol
- tcp—Transmission Control Protocol
- tnp—Trivial Network Protocol
- ttp—TNP Tunneling Protocol
- tudp—Trivial User Datagram Protocol
- udp—User Datagram Protocol
- vpls—Virtual Private LAN Service

all-chassis (TX Matrix and TX Matrix Plus routers only) (Optional) Display system statistics for a protocol for all the routers in the chassis.

all-lcc (TX Matrix and TX Matrix Plus routers only) (Optional) On a TX Matrix router, display system statistics for a protocol for all T640 routers (or line-card chassis) connected to the TX Matrix router. On a TX Matrix Plus router, display system statistics for a protocol for all routers (line-card chassis) connected to the TX Matrix Plus router

all-members (EX4200 switches and MX Series routers only) (Optional) Display system statistics for a protocol for all members of the Virtual Chassis configuration.

lcc *number* (TX Matrix and TX Matrix Plus routers only) (Optional) On a TX Matrix router, display system statistics for a protocol for a specific T640 router that is connected to the TX Matrix router. On a TX Matrix Plus router, display system statistics for a protocol for a specific router that is connected to the TX Matrix Plus router.

Replace *number* with the following values depending on the LCC configuration:

- 0 through 3, when T640 routers are connected to a TX Matrix router in a routing matrix.
- 0 through 3, when T1600 routers are connected to a TX Matrix Plus router in a routing matrix.
- 0 through 7, when T1600 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.
- 0, 2, 4, or 6, when T4000 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.

local (EX4200 switches and MX Series routers only) (Optional) Display system statistics for a protocol for the local Virtual Chassis member.

member *member-id* (EX4200 switches and MX Series routers only) (Optional) Display system statistics for a protocol for the specified member of the Virtual Chassis configuration. For EX4200 switches, replace *member-id* with a value from 0 through 9. For an MX Series Virtual Chassis, replace *member-id* with a value of 0 or 1.

scc (TX Matrix routers only) (Optional) Display system statistics for a protocol for the TX Matrix router (or switch-card chassis).

sfc *number* (TX Matrix Plus routers only) (Optional) Display system statistics for a protocol for the TX Matrix Plus router (or switch-fabric chassis). Replace *number* with 0.

Additional Information

By default, when you issue the `show system statistics` command on a TX Matrix or TX Matrix Plus primary Routing Engine, the command is broadcast to all the T640 (in a routing matrix based on the TX Matrix router) or T1600 (in a routing matrix based on the TX Matrix Plus router) primary Routing Engines connected to it. Likewise, if you issue the same command on the TX Matrix or TX Matrix Plus backup Routing Engine, the command is broadcast to all the T640 (in a routing matrix based on the TX Matrix router) or T1600 (in a routing matrix based on the TX Matrix Plus router) backup Routing Engines that are connected to it.

Required Privilege Level

view

Sample Output

show system statistics

```
user@host> show system statistics
ip:
        3682087 total packets received
        0 bad header checksums
        0 with size smaller than minimum
        0 with data size < data length
        0 with header length < data size
        0 with data length < header length
        0 with incorrect version number
        0 packets destined to dead next hop
        0 fragments received
        0 fragments dropped (dup or out of space)
        0 fragments dropped (queue overflow)
        0 fragments dropped after timeout
        0 fragments dropped due to over limit
        0 packets reassembled ok
        3664774 packets for this host
        17316 packets for unknown/unsupported protocol
        0 packets forwarded
        0 packets not forwardable
        0 redirects sent
        6528 packets sent from this host
        0 packets sent with fabricated ip header
```

```
        0 output packets dropped due to no bufs
        0 output packets discarded due to no route
        0 output datagrams fragmented
        0 fragments created
        0 datagrams that can't be fragmented
        0 packets with bad options
        1123 packets with options handled without error
        0 strict source and record route options
        0 loose source and record route options
        0 record route options
        0 timestamp options
        0 timestamp and address options
        0 timestamp and prespecified address options
        0 option packets dropped due to rate limit
        1123 router alert options
        0 multicast packets dropped (no iflist)
        0 packets dropped (src and int don't match)
icmp:
        0 drops due to rate limit
        0 calls to icmp_error
        0 errors not generated because old message was icmp
        Output histogram:
                echo reply: 75
        0 messages with bad code fields
        0 messages less than the minimum length
        0 messages with bad checksum
        0 messages with bad source address
        0 messages with bad length
        0 echo drops with broadcast or multicast destination address
        0 timestamp drops with broadcast or multicast destination address
        Input histogram:
                echo: 75
                router advertisement: 130
        75 message responses generated
tcp:
        3844 packets sent
                3618 data packets (1055596 bytes)
                0 data packets (0 bytes) retransmitted
                0 resends initiated by MTU discovery
                205 ack-only packets (148 packets delayed)
                0 URG only packets
                0 window probe packets
                0 window update packets
```

```
        1079 control packets
5815 packets received
        3377 acks (for 1055657 bytes)
        24 duplicate acks
        0 acks for unsent data
        2655 packets (15004 bytes) received in-sequence
        1 completely duplicate packet  (0 bytes)
        0 old duplicate packets
        0 packets with some dup. data (0 bytes duped)
        0 out-of-order packets (0 bytes)
        0 packets (0 bytes) of data after window
        0 window probes
        7 window update packets
        0 packets received after close
        0 discarded for bad checksums
        0 discarded for bad header offset fields
        0 discarded because packet too short
1 connection request
32 connection accepts
0 bad connection attempts
0 listen queue overflows
33 connections established (including accepts)
30 connections closed (including 0 drops)
        27 connections updated cached RTT on close
        27 connections updated cached RTT variance on close
        0 connections updated cached ssthresh on close
0 embryonic connections dropped
3374 segments updated rtt (of 3220 attempts)
0 retransmit timeouts
        0 connections dropped by rexmit timeout
0 persist timeouts
        0 connections dropped by persist timeout
344 keepalive timeouts
        0 keepalive probes sent
        0 connections dropped by keepalive
1096 correct ACK header predictions
1314 correct data packet header predictions
32 syncache entries added
        0 retransmitted
        0 dupsyn
        0 dropped
        32 completed
        0 bucket overflow
```

```
                0 cache overflow
                0 reset
                0 stale
                0 aborted
                0 badack
                0 unreach
                0 zone failures
        0 cookies sent
        0 cookies received
        0 ACKs sent in response to in-window but not exact RSTs
        0 ACKs sent in response to in-window SYNs on established connections
        0 rcv packets dropped by TCP due to bad address
        0 out-of-sequence segment drops due to insufficient memory
        1058 RST packets
        0 ICMP packets ignored by TCP
        0 send packets dropped by TCP due to auth errors
        0 rcv packets dropped by TCP due to auth errors
udp:
        3658884 datagrams received
        0 with incomplete header
        0 with bad data length field
        0 with bad checksum
        3657342 dropped due to no socket
        3657342 broadcast/multicast datagrams dropped due to no socket
        0 dropped due to full socket buffers
        0 not for hashed pcb
        4291311496 delivered
        1551 datagrams output
ipsec:
        0 inbound packets processed successfully
        0 inbound packets violated process security policy
        0 inbound packets with no SA available
        0 invalid inbound packets
        0 inbound packets failed due to insufficient memory
        0 inbound packets failed getting SPI
        0 inbound packets failed on AH replay check
        0 inbound packets failed on ESP replay check
        0 inbound AH packets considered authentic
        0 inbound AH packets failed on authentication
        0 inbound ESP packets considered authentic
        0 inbound ESP packets failed on authentication
        0 outbound packets processed successfully
        0 outbound packets violated process security policy
```

```
        0 outbound packets with no SA available
        0 invalid outbound packets
        0 outbound packets failed due to insufficient memory
        0 outbound packets with no route
igmp:
        17186 messages received
        0 messages received with too few bytes
        0 messages received with bad checksum
        0 membership queries received
        0 membership queries received with invalid field(s)
        0 membership reports received
        0 membership reports received with invalid field(s)
        0 membership reports received for groups to which we belong
        0 membership reports sent
arp:
        44181302 datagrams received
        2 ARP requests received
        2028 ARP replies received
        3156 resolution requests received
        0 unrestricted proxy requests
        0 received proxy requests
        0 proxy requests not proxied
        0 with bogus interface
        787 with incorrect length
        712 for non-IP protocol
        0 with unsupported op code
        0 with bad protocol address length
        0 with bad hardware address length
        0 with multicast source address
        7611 with multicast target address
        0 with my own hardware address
        14241699 for an address not on the interface
        0 with a broadcast source address
        0 with source address duplicate to mine
        29929250 which were not for me
        0 packets discarded waiting for resolution
        6 packets sent after waiting for resolution
        17812 ARP requests sent
        2 ARP replies sent
        0 requests for memory denied
        0 requests dropped on entry
        0 requests dropped during retry
ip6:
```

```
        0 total packets received
        0 with size smaller than minimum
        0 with data size < data length
        0 with bad options
        0 with incorrect version number
        0 fragments received
        0 fragments dropped (dup or out of space)
        0 fragments dropped after timeout
        0 fragments that exceeded limit
        0 packets reassembled ok
        0 packets for this host
        0 packets forwarded
        0 packets not forwardable
        0 redirects sent
        0 packets sent from this host
        0 packets sent with fabricated ip header
        0 output packets dropped due to no bufs, etc.
        0 output packets discarded due to no route
        0 output datagrams fragmented
        0 fragments created
        0 datagrams that can't be fragmented
        0 packets that violated scope rules
        0 multicast packets which we don't join
        Mbuf statistics:
        0 packets whose headers are not continuous
        0 tunneling packets that can't find gif
        0 packets discarded due to too may headers
        0 failures of source address selection
        0 forward cache hit
        0 forward cache miss
        0 packets destined to dead next hop
        0 option packets dropped due to rate limit
        0 packets dropped (src and int don't match)
        0 packets dropped due to bad protocol
icmp6:
        0 calls to icmp_error
        0 errors not generated because old message was icmp error or so
        0 errors not generated because rate limitation
        0 messages with bad code fields
        0 messages < minimum length
        0 bad checksums
        0 messages with bad length
        Histogram of error messages to be generated:
```

```
                0 no route
                0 administratively prohibited
                0 beyond scope
                0 address unreachable
                0 port unreachable
                0 packet too big
                0 time exceed transit
                0 time exceed reassembly
                0 erroneous header field
                0 unrecognized next header
                0 unrecognized option
                0 redirect
                0 unknown
        0 message responses generated
        0 messages with too many ND options
ipsec6:
        0 inbound packets processed successfully
        0 inbound packets violated process security policy
        0 inbound packets with no SA available
        0 invalid inbound packets
        0 inbound packets failed due to insufficient memory
        0 inbound packets failed getting SPI
        0 inbound packets failed on AH replay check
        0 inbound packets failed on ESP replay check
        0 inbound AH packets considered authentic
        0 inbound AH packets failed on authentication
        0 inbound ESP packets considered authentic
        0 inbound ESP packets failed on authentication
        0 outbound packets processed successfully
        0 outbound packets violated process security policy
        0 outbound packets with no SA available
        0 invalid outbound packets
        0 outbound packets failed due to insufficient memory
        0 outbound packets with no route
clnl:
        0 total packets received
        0 packets delivered
        0 too small
        0 bad header length
        0 bad checksum
        0 bad version
        0 unknown or unsupported protocol
        0 bogus sdl size
```

```
        0 no free memory in socket buffer
        0 send packets discarded
        0 sbappend failure
        0 mcopy failure
        0 address fields were not reasonable
        0 segment information forgotten
        0 forwarded packets
        0 total packets sent
        0 output packets discarded
        0 non-forwarded packets
        0 packets fragmented
        0 fragments sent
        0 fragments discarded
        0 fragments timed out
        0 fragmentation prohibited
        0 packets reconstructed
        0 packets destined to dead nexthop
        0 packets discarded due to no route
        0 Error pdu rate drops
        0 ER pdu generation failure
esis:
        0 total pkts received
        0 total packets consumed by protocol
        0 pdus received with bad checksum
        0 pdus received with bad version number
        0 pdus received with bad type field
        0 short pdus received
        0 bogus sdl size
        0 bad header length
        0 unknown or unsupported protocol
        0 no free memory in socket buffer
        0 send packets discarded
        0 sbappend failure
        0 mcopy failure
        0 ISO family not configured
tnp:
        146776365 unicast packets received
        0 broadcast packets received
        0 fragmented packets received
        0 hello packets dropped
        0 fragments dropped
        0 fragment reassembly queue flushes
        0 hello packets received
```

```
        0 control packets received
        49681642 rdp packets received
        337175 udp packets received
        96757548 tunnel packets received
        0 input packets discarded with no protocol
        98397591 unicast packets sent
        0 broadcast packets sent
        0 fragmented packets sent
        0 hello packets dropped
        0 fragments dropped
        0 hello packets sent
        0 control packets sent
        49681642 rdp packets sent
        337175 udp packets sent
        48378774 tunnel packets sent
        0 packets sent with unknown protocol
rdp:
        49681642 input packets
        0 discards for bad checksum
        0 discards bad sequence number
        0 refused connections
        2031964 acks received
        0 dropped due to full socket buffers
        49692 retransmits
        49681642 output packets
        24815968 acks sent
        28 connects
        0 closes
        22783990 keepalives received
        22783990 keepalives sent
tudp:
        337175 datagrams received
        0 with incomplete header
        0 with bad data length field
        0 with bad checksum
        0 dropped due to no socket
        0 broadcast/multicast datagrams dropped due to no socket
        0 dropped due to full socket buffers
        337175 delivered
        337175 datagrams output
ttp:
        398749 packets sent
        0 packets sent while unconnected
```

```
        0 packets sent while interface down
        0 packets sent couldn't get buffer
        0 packets sent couldn't find neighbor
        44696687 L2 packets received
        0 unknown L3 packets received
        3682087 IPv4 L3 packets received
        0 MPLS L3 packets received
        0 MPLS->IPv4 L3 packets received
        0 IPv4->MPLS L3 packets received
        0 VPLS L3 packets received
        0 IPv6 L3 packets received
        0 ARP L3 packets received
        0 CLNP L3 packets received
        0 TNP L3 packets received
        0 NULL L3 packets received
        0 cyclotron cycle L3 packets received
        0 cyclotron send L3 packets received
        0 packets received while unconnected
        0 packets received from unknown ifl
        0 input packets couldn't get buffer
        0 input packets with bad type
        0 input packets with discard type
        0 Input packets with bad tlv header
        70633 Input packets with bad tlv type
        68877 Input packets dropped based on tlv result
        0 input packets for which rt lookup is bypassed
mpls:
        0 total mpls packets received
        0 packets forwarded
        0 packets dropped
        0 with header too small
        0 after tagging, can't fit link MTU
        0 with IPv4 explicit NULL tag
        0 with IPv4 explicit NULL cksum errors
        0 with router alert tag
        0 lsp ping packets (ttl-expired/router alert)
        0 with ttl expired
        0 with tag encoding error
        0 packets discarded, no route
jsr:
     Handle-inf:o
         0 Handles in use
         0 Handles allocated so far
```

```
        0 Handles freed so far
        0 Handles in delayed free state
    IHA:
        0 IHA invalid subtype messages
        0 IHA invalid length messages
        0 IHA invalid version messages
        0 IHA too short messages
        0 IHA invalid dst handle messages
        0 IHA invalid src handle messages
        0 IHA unmatched src handle messages
        0 IHA invalid messages for primary
        0 IHA invalid messages for secondary
        0 IHA invalid messages for current state
        0 IHA messages sent for subtype init
        0 IHA messages rcvd for subytpe init
        0 IHA messages sent for subtype init
        0 IHA messages rcvd for subytpe init
        0 IHA messages sent for subtype init
        0 IHA messages rcvd for subytpe init
        0 IHA messages sent for subtype init
        0 IHA messages rcvd for subytpe init
        0 IHA messages sent for subtype init
        0 IHA messages rcvd for subytpe init
        0 IHA message timeouts
        0 IHA socket unreplicate messages
    SDRL:
        0 SDRL socket teardowns
        0 SDRL socket teardown failures
        0 SDRL socket unreplicates
        0 SDRL socket unreplicate failures
        0 SDRL external timeouts
        0 SDRL internal timeouts
        0 SDRL ipc messages sent
        0 SDRL ipc send failures
        0 SDRL ipc messages recvd
        0 SDRL ipc messages recvd
        0 SDRL primary replication messages sent
        0 SDRL primary replication message send failures
        0 SDRL primary ack messages received
        0 SDRL primary ack message receive failures
        0 SDRL primary sock replication inits
        0 SDRL primary sock replication init failures
        0 SDRL primary throttle remove messages
```

```
        0 SDRL primary throttle remove failures
        0 SDRL primary init handshake messages
        0 SDRL primary init handshake failures
        0 SDRL secondary replication messages received
        0 SDRL secondary replication message receive failures
        0 SDRL secondary replication acks sent
        0 SDRL secondary replication ack send failures
        0 SDRL secondary sock splits
        0 SDRL secondary sock split failures
        0 SDRL secondary sock merges
        0 SDRL secondary sock merge failures
        0 SDRL secondary sockets closed
        0 SDRL secondary rcv snoop fd close failures
        0 SDRL secondary snd snoop fd close failures
        0 SDRL secondary init handshake messages
        0 SDRL secondary init handshake failures
    PRL:
        0 PRL packets enqueued
        0 PRL packets failed to enqueue
        0 PRL packets dequeued
        0 PRL packets failed to dequeue
        0 PRL queue entry allocations
        0 PRL queue entry frees
        0 calls to layer 4 input handlers
        0 failed calls to layer 4 input handlers
        0 PRL queue drains
        0 PRL replication timeouts
        0 PRL replication messages sent
        0 PRL replication message send failures
        0 PRL acknowledgment messages sent
        0 PRL acknowledgement message send failures
        0 PRL replication messages received
        0 PRL replication message receive failures
        0 PRL acknowledgement messages received
        0 PRL acknowledgement receive failures
        0 PRL messages with bad IPC type
        0 PRL messages with no handler
        2 PRL global state initializations
        1 PRL global state cleanups
        0 PRL per-socket state creations
        0 PRL per-socket state creation failures
        0 PRL per-socket state cleanups
        0 PRL socket closes
```

```
        0 PRL socket merges
        0 PRL socket unreplicates
        0 PRL primary socket replication initializations
        0 PRL secondary socket replication initializations
        0 PRL primary socket replication activations
        0 PRL secondary socket replication activations
        0 packets received from peers
        0 PRL packets receive operations from peer failed
        0 PRL buffer pullup failures
        0 new pkts dropped on secondary socket
    PSRM:
        0 PSRM replication timeouts
        0 PSRM replication messages sent
        0 PSRM replication message send failures
        0 PSRM acknowledgment messages sent
        0 PSRM acknowledgement message send failures
        0 PSRM flow control messages sent
        0 PSRM flow control message send failures
        0 PSRM replication messages received
        0 PSRM replication message receive failures
        0 PSRM acknowledgment messages received
        0 PSRM acknowledgment message receive failures
        0 PSRM flow control messages received
        0 PSRM flow control message receive failures
        0 SRM messages with bad IPC type
        0 PSRM messages with no handler
        2 PSRM global state initializations
        1 PSRM global state cleanups
        0 PSRM per-socket state creations
        0 PSRM per-socket state creation failures
        0 PSRM per-socket state cleanups
        0 PSRM socket closes
        0 PSRM socket merges
        0 PSRM socket unreplicates
        0 PSRM primary socket replication initializations
        0 psrm-secondary-socket-replication-initializations
        0 PSRM primary socket replication activations
        0 secondary socket replication activations
        0 PSRM tcpcb updates
        0 PSRM buffer pullup failures
        73 PSRM tcp timestamp msg recv counters
        0 PSRM tcp timestamp msg recv failures
        0 PSRM tcp timestamp msg send counters
```

```
          0 PSRM tcp timestamp msg send failures
     TCP:
          0 TCP out-of-order packets on JSR sockets
vpls:
        0 total packets received
        0 with size smaller than minimum
        0 with incorrect version number
        0 packets for this host
        0 packets with no logical interface
        0 packets with no family
        0 packets with no route table
        0 packets with no auxiliary table
        0 packets with no corefacing entry
        0 packets with no CE-facing entry
        0 mac route learning requests
        0 mac routes learnt
        0 requests to learn an existing route
        0 learning requests while learning disabled on interface
        0 learning requests over capacity
        0 mac routes moved
        0 requests to move static route
        0 mac route aging requests
        0 mac routes aged
        0 bogus address in aging requests
        0 requests to age static route
        0 requests to re-ageout aged route
        0 requests involving multiple peer FEs
        0 aging acks from PFE
        0 aging non-acks from PFE
        0 aging requests timed out waiting on FEs
        0 aging requests over max-rate
        0 errors finding peer FEs
Sctp:
         195 sinput-packets
         195 datagrams
         9 packets that had data
         9 input SACK chunks
         9 input DATA chunks
         0 duplicate DATA chunks
         27 input HB chunks
         27 HB-ACK chunks
         0 input ECNE chunks
         0 input AUTH chunks
```

```
        0 chunks missing AUTH
        0 invalid HMAC ids received
        0 invalid secret ids received
        0 auth failed
        7 fast path receives all one chunk
        0 fast path multi-part data
        209 output packets
        9 output SACKs
        9 output DATA chunks
        0 retransmitted DATA chunks
        0 fast retransmitted DATA chunks
        0 FR's that happened more than once to same chunk
        153 output HB chunks
        0 output ECNE chunks
        0 output AUTH chunks
        9 ip_output error counter
        0 from middle box
        0 from end host
        0 with data
        0 non-data, non-endhost
        0 non-endhost, bandwidth rep only
        0 not enough for chunk header
        0 not enough data to confirm
        0 where process_chunk_drop said break
        0 failed to find TSN
        0 attempt reverse TSN lookup
        0 e-host confirms zero-rwnd
        0 midbox confirms no space
        0 data did not match TSN
        0 TSN's marked for Fast Retran
        0 iterator timers fired
        1 T3 data time outs
        0 window probe (T3) timers fired
        0 INIT timers fired
        7 sack timers fired
        0 shutdown timers fired
        157 heartbeat timers fired
        0 a cookie timeout fired
        0 an endpoint changed its cookiesecret
        0 PMTU timers fired
        0 shutdown ack timers fired
        0 shutdown guard timers fired
        0 stream reset timers fired
```

```
        0 early FR timers fired
        0 an asconf timer fired
        0 auto close timer fired
        0 asoc free timers expired
        1 inp free timers expired
        0 packet shorter than header
        0 checksum error
        0 no endpoint for port
        0 bad v-tag
        0 bad SID
        0 no memory
        0 number of multiple FR in a RTT window
        9 RFC813 allowed sending
        0 RFC813 does not allow sending
        0 times max burst prohibited sending
        0 look ahead tells us no memory in interface
        0 numbers of window probes sent
        0 times an output error to clamp down on next user send
        1 times sctp_senderrors were caused from a user
        0 number of in data drops due to chunk limit reached
        0 number of in data drops due to rwnd limit reached
        0 times a ECN reduced the cwnd
      195 used express lookup via vtag
        0 collision in express lookup
        0 times the sender ran dry of user data on primary
        0 sacks the slow way
        0 window update only sacks sent
        0 sends with sinfo_flags !=0
        0 unordered sends
        0 sends with EOF flag set
        0 sends with ABORT flag set
      188 times protocol drain called
        0 times we did a protocol drain
        0 times recv was called with peek
      197 cached chunks used
        0 cached stream oq's used
        0 unread messages abandonded by close
        0 send burst avoidance, already max burst inflight to net
        0 send cwnd full avoidance, already max burst inflight to net
        0 number of map array over-runs via fwd-tsn's
```

Release Information

Command introduced before JUNOS Release 7.4.

`sfc` option introduced for the TX Matrix Plus router in JUNOS Release 9.6.

show system storage

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Syntax

```
show system storage
<detail>
<invoke-on (all-routing-engines | other-routing-engine)>
```

Syntax (EX Series Switches and MX Series Routers)

```
show system storage
<detail>
<all-members>
<local>
<member member-id>
<invoke-on (all-routing-engines | other-routing-engine)>
```

Syntax

Syntax (QFX Series)

```
show system storage
<detail>
<infrastructure name>
<interconnect-device name>
<node-group name>
<invoke-on (all-routing-engines | other-routing-engine)>
```

Syntax (SRX Series)

```
show system storage
<detail>
<partitions>
```

For more information, see *show system storage partitions* (View SRX Series).

Syntax (TX Matrix Router)

```
show system storage
<detail>
<all-chassis | all-lcc | lcc number / scc>
<invoke-on (all-routing-engines | other-routing-engine)>
```

Syntax (TX Matrix Plus Router and TX Matrix Plus Router with 3D SIBs)

```
show system storage
<detail>
<all-chassis | all-lcc | lcc number | sfc number> p
<invoke-on (all-routing-engines | other-routing-engine)>
```

Syntax (Junos OS Evolved)

```
show system storage
<detail>
<node node-name>
```

Description

Display statistics about the amount of free disk space in the router's or switch's file systems.

Options

none	Display standard information about the amount of free disk space in the router's or switch's file systems.
detail	(Optional) Display detailed output.
invoke-on all-routing-engines	(Optional) Display the system storage information on all primary and backup Routing Engines on a routing matrix based on the TX Matrix or TX Matrix Plus router or on a router that has dual Routing Engines.
invoke-on other-routing-engines	(Optional) Display the system storage information on the other Routing Engine. For example, if you issue this command on the primary Routing Engine on an M320 router, the JUNOS Software displays the system storage information on the backup Routing Engine. On a routing matrix based on the TX Matrix or TX Matrix Plus router, if you issue this command on the TX Matrix or TX Matrix Plus router's primary Routing Engine, the JUNOS Software displays all the system storage information on all the backup Routing Engines.
all-chassis	(TX Matrix routers and TX Matrix Plus routers only) (Optional) Display system storage statistics for all the routers in the chassis.

all-lcc (TX Matrix routers and TX Matrix Plus routers only) (Optional) On a TX Matrix router, display system storage statistics for all T640 routers connected to the TX Matrix router. On a TX Matrix Plus router, display system storage statistics for all routers connected to the TX Matrix Plus router.

all-members (EX4200 switches and MX Series routers only) (Optional) Display system storage statistics for all members of the Virtual Chassis configuration.

infrastructure *name* (QFabric systems only) (Optional) Display system storage statistics for the fabric control Routing Engines or fabric manager Routing Engines.

interconnect-device *name* (QFabric systems only) (Optional) Display system storage statistics for the Interconnect device.

lcc *number* (TX Matrix routers and TX Matrix Plus routers only) (Optional) On a TX Matrix router, display system storage statistics for a specific T640 router that is connected to the TX Matrix router. On a TX Matrix Plus router, display system storage statistics for a specific router that is connected to the TX Matrix Plus router.

Replace *number* with the following values depending on the LCC configuration:

- 0 through 3, when T640 routers are connected to a TX Matrix router in a routing matrix.
- 0 through 3, when T1600 routers are connected to a TX Matrix Plus router in a routing matrix.
- 0 through 7, when T1600 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.
- 0, 2, 4, or 6, when T4000 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.

local (EX4200 switches and MX Series routers only) (Optional) Display system storage statistics for the local Virtual Chassis member.

member *member-id* (EX4200 switches and MX Series routers only) (Optional) Display system storage statistics for the specified member of the Virtual Chassis configuration. For EX4200 switches, replace *member-id* with a value from 0 through 9. For an MX Series Virtual Chassis, replace *member-id* with a value of 0 or 1.

node (Junos OS Evolved only) (Optional) Display system storage statistics for the specified node.

node-group *name* (QFabric systems only) (Optional) Display system storage statistics for the Node group.

scc (TX Matrix routers only) (Optional) Display system storage statistics for the TX Matrix router (or switch-card chassis).

sfc *number* (TX Matrix Plus routers only) (Optional) Display system storage statistics for the TX Matrix Plus router. Replace *number* with 0.

Additional Information

By default, when you issue the `show system storage` command on the primary Routing Engine of a TX Matrix router or a TX Matrix Plus router, the command is broadcast to all the primary Routing Engines of the LCCs connected to it in the routing matrix. Likewise, if you issue the same command on the backup Routing Engine of a TX Matrix or a TX Matrix Plus router, the command is broadcast to all backup Routing Engines of the LCCs that are connected to it in the routing matrix.

Required Privilege Level

view

Output Fields

Table 16 on page 376 describes the output fields for the `show system storage` command. Output fields are listed in the approximate order in which they appear.

Table 16: show system storage Output Fields

Field Name	Field Description	Level of Detail
`Filesystem`	Name of the filesystem.	all
`Size`	Size of the filesystem. Size is reported in human readable form (GB or MB, etc.).	standard output
1024-blocks	Size of the filesystem. Size is reported in 1024-bytes (1KB) blocks.	`detail`
`Used`	Amount of space used in the filesystem.	all (see note)

Table 16: show system storage Output Fields *(Continued)*

Field Name	Field Description	Level of Detail
`Avail`	Amount of space available in the filesystem.	all (see note)
`Capacity`	Percentage of the filesystem space that is being used.	all
`Mounted on`	Directory in which the filesystem is mounted.	all

NOTE: In detailed output, the output is in bytes, whereas in regular output, the size is in human-readable form (like GB or MB, etc.).

Sample Output

show system storage

```
user@host> show system storage
Filesystem             Size       Used      Avail  Capacity   Mounted on
/dev/ad0s1a             77M        37M        34M       52%  /
devfs                   16K        16K         0B      100%  /dev/
/dev/vn0                12M        12M         0B      100%  /packages/mnt/jbase
/dev/vn1                39M        39M         0B      100%  /packages/mnt/jkernel-7.2R1.7
/dev/vn2                12M        12M         0B      100%  /packages/mnt/jpfe-M40-7.2R1.7
/dev/vn3               2.3M       2.3M         0B      100%  /packages/mnt/jdocs-7.2R1.7
/dev/vn4                14M        14M         0B      100%  /packages/mnt/jroute-7.2R1.7
/dev/vn5               4.5M       4.5M         0B      100%  /packages/mnt/jcrypto-7.2R1.7
mfs:172                1.5G       4.0K       1.3G        0%  /tmp
/dev/ad0s1e             12M        20K        11M        0%  /config
procfs                 4.0K       4.0K         0B      100%  /proc
/dev/ad1s1f            9.4G       4.9G       3.7G       57%  /var
```

show system storage (SRX Series)

```
user@host> show system storage
Filesystem             Size       Used      Avail  Capacity   Mounted on
/dev/da0s1a            2.4G       369M       1.9G       16%  /
```

```
devfs                  1.0K       1.0K         0B      100%  /dev
/dev/md0                20M        11M        6.7M       63%  /junos
/cf/packages           2.4G       369M       1.9G       16%  /junos/cf/packages
devfs                  1.0K       1.0K         0B      100%  /junos/cf/dev
/dev/md1               1.2G       1.2G         0B      100%  /junos
/cf                     20M        11M        6.7M       63%  /junos/cf
devfs                  1.0K       1.0K         0B      100%  /junos/dev/
/cf/packages           2.4G       369M       1.9G       16%  /junos/cf/packages1
procfs                 4.0K       4.0K         0B      100%  /proc
/dev/bo0s3e            185M        74K       170M        0%  /config
/dev/bo0s3f            2.1G       1.7G       219M       89%  /cf/var
/dev/md2               1.0G        90M       859M       10%  /mfs
/cf/var/jail           2.1G       1.7G       219M       89%  /jail/var
/cf/var/log            2.1G       1.7G       219M       89%  /jail/var/log
devfs                  1.0K       1.0K         0B      100%  /jail/dev
/dev/md3               1.8M       4.0K       1.7M        0%  /jail/mfs
```

show system storage node

```
user@host> show system storage node re1
Filesystem             Size       Used      Avail  Capacity   Mounted on
/dev/root               44M        44M          0      100%  /pivot
devtmpfs               7.8G          0       7.8G        0%  /dev
/dev/sda2               16G       4.9G        11G       33%  /soft
/dev/sda5              3.0G       122M       2.7G        5%  /etc
/dev/sda6             1000M       1.3M       932M        1%  /config
/dev/sda7               16G       9.4G       5.4G       64%  /var
/dev/sda1              189M       5.3M       170M        4%  /boot
/dev/loop0             1.8G       1.8G          0      100%  /pivot/data/junos-install-qfx-
x86-64-16.2I20170508115447_evo-builder/ccd-ptx-re64
/dev/loop1              14M        14M          0      100%  /pivot/data/junos-install-qfx-
x86-64-16.2I20170508115447_evo-builder/perl-5.20.0
/dev/loop2              94M        94M          0      100%  /pivot/data/junos-install-qfx-
x86-64-16.2I20170508115447_evo-builder/java
/dev/loop3             2.4M       2.4M          0      100%  /pivot/data/junos-install-qfx-
x86-64-16.2I20170508115447_evo-builder/modules
/dev/loop4             9.4M       9.4M          0      100%  /pivot/data/junos-install-qfx-
x86-64-16.2I20170508115447_evo-builder/zookeeper
/dev/loop5              57M        57M          0      100%  /pivot/data/junos-install-qfx-
x86-64-16.2I20170508115447_evo-builder/python-2.7
/dev/loop6              14M        14M          0      100%  /pivot/data/junos-install-qfx-
```

```
x86-64-16.2I20170508115447_evo-builder/python-3.3
/dev/loop7              191M       191M          0      100%  /pivot/data/junos-install-qfx-
x86-64-16.2I20170508115447_evo-builder/dev
/dev/loop8              3.8M       3.8M          0      100%  /pivot/data/junos-install-qfx-
x86-64-16.2I20170508115447_evo-builder/jimbase
/dev/loop9              103M       103M          0      100%  /pivot/data/junos-install-qfx-
x86-64-16.2I20170508115447_evo-builder/osbase
/dev/loop10              44M        44M          0      100%  /pivot/data/junos-install-qfx-
x86-64-16.2I20170508115447_evo-builder/initrd
unionfs                 5.2G       2.4G       2.7G       48%  /
/tmp                    7.8G       4.0K       7.8G        1%  /tmp
run                     7.8G       7.1M       7.8G        1%  /run
tmpfs                   7.8G       1.2G       6.7G       15%  /dev/shm
tmpfs                   7.8G          0       7.8G        0%  /sys/fs/cgroup
tmpfs                   1.6G          0       1.6G        0%  /run/user/0
```

show system storage node detail

```
user@host> show system storage node re1 detail
Filesystem       1024-blocks       Used      Avail   Capacity   Mounted on
/dev/root              44376      44376          0       100%  /pivot
devtmpfs             8103560          0    8103560         0%  /dev
/dev/sda2           16513960    5057236   10601480        33%  /soft
/dev/sda5            3055376     124232    2757476         5%  /etc
/dev/sda6            1023892       1308     953772         1%  /config
/dev/sda7           16310696    9809324    5656368        64%  /var
/dev/sda1             193242       5418     173561         4%  /boot
/dev/loop0           1816864    1816864          0       100%  /pivot/data/junos-install-qfx-
x86-64-16.2I20170508115447_evo-builder/ccd-ptx-re64
/dev/loop1             13432      13432          0       100%  /pivot/data/junos-install-qfx-
x86-64-16.2I20170508115447_evo-builder/perl-5.20.0
/dev/loop2             95344      95344          0       100%  /pivot/data/junos-install-qfx-
x86-64-16.2I20170508115447_evo-builder/java
/dev/loop3              2384       2384          0       100%  /pivot/data/junos-install-qfx-
x86-64-16.2I20170508115447_evo-builder/modules
/dev/loop4              9528       9528          0       100%  /pivot/data/junos-install-qfx-
x86-64-16.2I20170508115447_evo-builder/zookeeper
/dev/loop5             57816      57816          0       100%  /pivot/data/junos-install-qfx-
x86-64-16.2I20170508115447_evo-builder/python-2.7
/dev/loop6             13320      13320          0       100%  /pivot/data/junos-install-qfx-
x86-64-16.2I20170508115447_evo-builder/python-3.3
```

```
/dev/loop7            195024     195024          0       100%  /pivot/data/junos-install-qfx-
x86-64-16.2I20170508115447_evo-builder/dev
/dev/loop8              3872       3872          0       100%  /pivot/data/junos-install-qfx-
x86-64-16.2I20170508115447_evo-builder/jimbase
/dev/loop9            105272     105272          0       100%  /pivot/data/junos-install-qfx-
x86-64-16.2I20170508115447_evo-builder/osbase
/dev/loop10            44376      44376          0       100%  /pivot/data/junos-install-qfx-
x86-64-16.2I20170508115447_evo-builder/initrd
unionfs              5412608    2481464    2757476        48%  /
/tmp                 8127388          4    8127384         1%  /tmp
run                  8127388       7216    8120172         1%  /run
tmpfs                8127388    1190096    6937292        15%  /dev/shm
tmpfs                8127388          0    8127388         0%  /sys/fs/cgroup
tmpfs                1625480          0    1625480         0%  /run/user/0
```

Release Information

Command introduced before Junos OS Release 7.4.

`sfc` option introduced for the TX Matrix Plus router in JUNOS Release 9.6.

Option `invoke-on (all-routing-engines | other-routing-engine)` introduced in Junos OS Release 14.1

`node` option introduced in Junos OS Evolved Release 18.3R1.

RELATED DOCUMENTATION

- Routing Matrix with a TX Matrix Plus Router Solutions Page
- show system storage partitions

show system switchover

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Syntax

```
show system switchover
```

Syntax (TX Matrix Router)

```
show system switchover
<all-chassis | all-lcc | lcc number | scc>
```

Syntax (TX Matrix Plus Router)

```
show system switchover
<all-chassis | all-lcc | lcc number | sfc number>
```

Syntax (MX Series Router)

```
show system switchover
<all-members>
<local>
<member member-id>
```

Description

Display whether graceful Routing Engine switchover is configured, the state of the kernel replication (ready or synchronizing), any replication errors, and whether the primary and standby Routing Engines are using compatible versions of the kernel database.

NOTE: Issue the `show system switchover` command *only* on the backup Routing Engine. This command is *not* supported on the primary Routing Engine because the `kernel-replication` process daemon does not run on the primary Routing Engine. This process runs only on the backup Routing Engine.

Beginning Junos OS Release 9.6, the `show system switchover` command has been deprecated on the primary Routing Engine on all routers other than a TX Matrix (switch-card chassis) or a TX Matrix Plus (switch-fabric chassis) router.

However, in a routing matrix, if you issue the `show system switchover` command on the primary Routing Engine of the TX Matrix router (or switch-card chassis), the CLI displays graceful switchover information for the primary Routing Engine of the T640 routers (or line-card chassis) in the routing matrix. Likewise, if you issue the `show system switchover` command on the primary Routing Engine of a TX Matrix Plus router (or switch-fabric chassis), the CLI displays output for the primary Routing Engine of T1600 or T4000 routers in the routing matrix.

Options

all-chassis (TX Matrix routers and TX Matrix Plus routers only) (Optional) On a TX Matrix router, display graceful Routing Engine switchover information for all Routing Engines on the TX Matrix router and the T640 routers configured in the routing matrix. On a TX Matrix Plus router, display graceful Routing Engine switchover information for all Routing Engines on the TX Matrix Plus router and the T1600 or T4000 routers configured in the routing matrix.

all-lcc (TX Matrix routers and TX Matrix Plus routers only) (Optional) On a TX Matrix router, display graceful Routing Engine switchover information for all T640 routers (or line-card chassis) connected to the TX Matrix router. On a TX Matrix Plus router, display graceful Routing Engine switchover information for all connected T1600 or T4000 LCCs.

Note that in this instance, packets get dropped. The LCCs perform GRES on their own chassis (GRES cannot be handled by one particular chassis for the entire router) and synchronization is not possible as the LCC plane bringup time varies for each LCC. Therefore, when there is traffic on these planes, there may be a traffic drop.

all-members (MX Series routers only) (Optional) Display graceful Routing Engine switchover information for all Routing Engines on all members of the Virtual Chassis configuration.

lcc *number* (TX Matrix routers and TX Matrix Plus routers only) (Optional) On a TX Matrix router, display graceful Routing Engine switchover information for a specific T640 router connected to the TX Matrix router. On a TX Matrix Plus router, display graceful Routing Engine switchover information for a specific router connected to the TX Matrix Plus router.

Replace *number* with the following values depending on the LCC configuration:

- 0 through 3, when T640 routers are connected to a TX Matrix router in a routing matrix.
- 0 through 3, when T1600 routers are connected to a TX Matrix Plus router in a routing matrix.
- 0 through 7, when T1600 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.
- 0, 2, 4, or 6, when T4000 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.

local (MX Series routers only) (Optional) Display graceful Routing Engines switchover information for all Routing Engines on the local Virtual Chassis member.

member *member-id* (MX Series routers only) (Optional) Display graceful Routing Engine switchover information for all Routing Engines on the specified member of the Virtual Chassis configuration. Replace *member-id* with a value of 0 or 1.

scc (TX Matrix router only) (Optional) Display graceful Routing Engine switchover information for the TX Matrix router (or switch-card chassis).

sfc (TX Matrix Plus routers only) (Optional) Display graceful Routing Engine switchover information for the TX Matrix Plus router.

Additional Information

If you issue the `show system switchover` command on a TX Matrix backup Routing Engine, the command is broadcast to all the T640 backup Routing Engines that are connected to it.

Likewise, if you issue the `show system switchover` command on a TX Matrix Plus backup Routing Engine, the command is broadcast to all the T1600 or T4000 backup Routing Engines that are connected to it.

If you issue the `show system switchover` command on the active Routing Engine in the primary router of an MX Series Virtual Chassis, the router displays a message that this command is not applicable on this member of the Virtual Chassis.

Required Privilege Level

view

Output Fields

Table 17 on page 384 describes the output fields for the `show system switchover` command. Output fields are listed in the approximate order in which they appear.

Table 17: show system switchover Output Fields

Field Name	Field Description
`Graceful switchover`	Display graceful Routing Engine switchover status: • `On`—Indicates `graceful-switchover` is specified for the `routing-options` configuration command. • `Off`—Indicates `graceful-switchover` is not specified for the `routing-options` configuration command.
`Configuration database`	State of the configuration database: • `Ready`—Configuration database has synchronized. • `Synchronizing`—Configuration database is synchronizing. Displayed when there are updates within the last 5 seconds. • `Synchronize failed`—Configuration database synchronize process failed.

Table 17: show system switchover Output Fields *(Continued)*

Field Name	Field Description
`Kernel database`	State of the kernel database: • `Ready`—Kernel database has synchronized. This message implies that the system is ready for GRES. • `Synchronizing`—Kernel database is synchronizing. Displayed when there are updates within the last 5 seconds. • `Version incompatible`—The primary and standby Routing Engines are running incompatible kernel database versions. • `Replication error`—An error occurred when the state was replicated from the primary Routing Engine. Inspect **Steady State** for possible causes, or notify Juniper Networks customer support.
`Peer state`	Routing Engine peer state: This field is displayed only when ksyncd is running in multichassis mode (LCC primary). • `Steady State`—Peer completed switchover transition. • `Peer Connected`—Peer in switchover transition.
`Switchover Status`	Switchover Status: • `Ready`—Message for system being switchover ready. • `Not Ready`—Message for system not being ready for switchover.

Table 17: show system switchover Output Fields *(Continued)*

Field Name	Field Description
`Platform Components`	Platform Components: FEB1: • `Not Online`—The backup FEB2 is not yet online. • `Online`—The backup FEB2 is online. FEB1-PFE0, FEB1- PFE1: • `Ready`—Message for FEB1- PFE0, or FEB1- PFE1 being switchover ready. The backup PFE is ready for switchover (does not include time for routes or nexthops for a scaled configuration). • `Not Online`—The backup PFE is not yet online. • `Sync In Progress`—Two-minute synchronization in progress when information flow data-path is programmed on the backup PFE (does not include time for routes or next-hops programming).

Sample Output

show system switchover (Backup Routing Engine - Ready)

```
user@host> show system switchover
Graceful switchover: On
Configuration database: Ready
Kernel database: Ready
Peer state: Steady State
Switchover Status: Ready
```

Switchover Status: Ready is the way the last line of the output reads if you are running Junos OS Release 16.1R1 or later. If you are running Junos OS Release 15.x, the last line of the output reads as Switchover Ready, for example:

```
user@host> show system switchover
Graceful switchover: On
Configuration database: Ready
```

```
Kernel database: Ready
Switchover Ready
```

show system switchover (Backup Routing Engine - Not Ready)

```
user@host> show system switchover
Graceful switchover: On
Configuration database: Ready
Kernel database: Ready
Peer state: Steady State
Switchover Status: Not Ready
```

Switchover Status: Not Ready is the way the last line of the output reads if you are running Junos OS Release 16.1R1 or later. If you are running Junos OS Release 15.x, the last line of the output reads as Not ready for primary role switch, try after xxx secs, for example:

```
user@host> show system switchover
Graceful switchover: On
Configuration database: Ready
Kernel database: Ready
Not ready for mastership switch, try after xxx secs.
```

show system switchover all-lcc (Routing Matrix and Routing Matrix Plus)

```
user@host> show system switchover all-lcc

lcc0-re0:
--------------------------------------------------------------------------
Multichassis replication: On
Configuration database: Ready
Kernel database: Ready
Peer state: Steady State
Switchover Status: Ready

lcc2-re0:
--------------------------------------------------------------------------
Multichassis replication: On
Configuration database: Ready
Kernel database: Ready
```

```
Peer state: Steady State
Switchover Status: Ready

<command>user@host> <user-typing>show system switchover</user-typing
>  </command>
<output>lcc0-re1:
-
Multichassis replication: On
Configuration database: Ready
Kernel database: Ready
Peer state: Steady State
Switchover Status: Ready

lcc2-re0:
-
Multichassis replication: On
Configuration database: Ready
Kernel database: Ready
Peer state: Steady State
Switchover Status: Ready</output>
</sample>
```

show system switchover (ACX7509)

The switchover status option for ACX7509 is only available on backup Routing Engine. The show outputs displayed system switchover status is "Ready" and "Not Ready" are as follows:

```
user@host> show system switchover
Graceful switchover: On
Configuration database: Ready
Object database: Ready
Applications' ready state: Ready
Switchover Status: Ready
Platform Components: Ready
FEB1 Online
FEB1-PFE0 Ready
FEB1-PFE1 Ready
user@host> show system switchover
Graceful switchover: On
Configuration database: Ready
Object database: Ready
```

```
Applications' ready state: Ready
Switchover Status: Not Ready
Platform Components: Not Ready
FEB1 Not Online
FEB1-PFE0 Not Online
FEB1-PFE1 Not Online
```

show system switchover (Backup Routing Engine - Junos OS Evolved)

```
{backup}
user@host> show system switchover
Graceful switchover: On
Configuration database: Ready
Object database: Ready
Applications' ready state: Ready
Switchover Status: Not Ready
```

Release Information

Command introduced before Junos OS Release 7.4.

`sfc` option introduced for the TX Matrix Plus router in Junos OS Release 9.6.

Command support added for ACX7509 in 22.1R1 for High Availability Platform Redundancy RCB and FEB switchover.

RELATED DOCUMENTATION

> Routing Matrix with a TX Matrix Plus Router Solutions Page
>
> No Link Title

show system uptime

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Syntax

```
show system uptime
```

Syntax (EX Series Switches)

```
show system uptime
<all-members>
<local>
<member member-id>
```

Syntax (QFX Series)

```
show system uptime
<director-group name>
<infrastructure name>
<interconnect-device name>
<node-group name>
```

Syntax (TX Matrix Router)

```
show system uptime
<all-chassis | all-lcc | lcc number / scc>
```

Syntax (TX Matrix Plus Router)

```
show system uptime
<detail>
<all-chassis | all-lcc | lcc number | sfc number>
```

Syntax (MX Series Router)

```
show system uptime
<all-members>
<invoke-on>
<local>
<member member-id>
```

Syntax (Junos OS Evolved)

```
show system uptime
<node node-name>
```

Description

Display the current time and information about how long the router or switch, router or switch software, and routing protocols have been running.

NOTE: Time values computed from differences in timestamps can vary due to the insertion or deletion of leap-seconds between them.

The `show system uptime` command is a little different in how it displays output in Junos OS Evolved. The `show system uptime` command by itself shows system-wide uptime information. Use the `show system uptime node` *`node-name`* command to see node-specific uptime information, where *`node-name`* can be `re0 | re1 | fpc0 | all`.

Options

none	Show time since the system rebooted and processes started.
all-chassis	(TX Matrix routers and TX Matrix Plus routers only) (Optional) Show time since the system rebooted and processes started on all the routers in the chassis.
all-lcc	(TX Matrix routers and TX Matrix Plus routers only) (Optional) On a TX Matrix router, show time since the system rebooted and processes started for all T640 routers (or line-card chassis) connected to the TX Matrix router. On a TX Matrix Plus router, show time since the system rebooted and processes started for all connected T1600 or T4000 LCCs.
all-members	(EX4200 switches and MX Series routers only) (Optional) Show time since the system rebooted and processes started on all members of the Virtual Chassis configuration.
director-group *name*	(QFabric systems only) (Optional) Show time since the system rebooted and processes started on the Director group.
infrastructure *name*	(QFabric systems only) (Optional) Show time since the system rebooted and processes started on the fabric control Routing Engine and fabric manager Routing Engine.
interconnect-device *name*	(QFabric systems only) (Optional) Show time since the system rebooted and processes started on the Interconnect device.

invoke-on (MX Series routers only) (Optional) Display the time since the system rebooted and processes started on the primary Routing Engine, backup Routing Engine, or both, on a router with two Routing Engines.

lcc *number* (TX Matrix routers and TX Matrix Plus routers only) (Optional) On a TX Matrix router, show time since the system rebooted and processes started for a specific T640 router that is connected to the TX Matrix router. On a TX Matrix Plus router, show time since the system rebooted and processes started for a specific router that is connected to the TX Matrix Plus router.

Replace *number* with the following values depending on the LCC configuration:

- 0 through 3, when T640 routers are connected to a TX Matrix router in a routing matrix.
- 0 through 3, when T1600 routers are connected to a TX Matrix Plus router in a routing matrix.
- 0 through 7, when T1600 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.
- 0, 2, 4, or 6, when T4000 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.

local (EX4200 switches and MX Series routers only) (Optional) Show time since the system rebooted and processes started on the local Virtual Chassis member.

member *member-id* (EX4200 switches and MX Series routers only) (Optional) Show time since the system rebooted and processes started on the specified member of the Virtual Chassis configuration. For EX4200 switches, replace *member-id* with a value from 0 through 9. For an MX Series Virtual Chassis, replace *member-id* with a value of 0 or 1.

node *node-name* (Junos OS Evolved only) (Optional) Display uptime information for the specified node. When node option is not used, display uptime information for entire system. From the system's point of view, the system booted time is the time when the system was assembled and is available in **/var/run/system_boot_time**.

node-group *name* (QFabric systems only) (Optional) Show time since the system rebooted and processes started on the Node group.

scc (TX Matrix routers only) (Optional) Show time since the system rebooted and processes started for the TX Matrix router (or switch-card chassis).

sfc *number* (TX Matrix Plus routers only) (Optional) Show time since the system rebooted and processes started for the TX Matrix Plus router. Replace *number* with 0.

Additional Information

By default, when you issue the `show system uptime` command on the primary Routing Engine of a TX Matrix router or a TX Matrix Plus router, the command is broadcast to all the primary Routing Engines of the LCCs connected to it in the routing matrix. Likewise, if you issue the same command on the backup Routing Engine of a TX Matrix or a TX Matrix Plus router, the command is broadcast to all backup Routing Engines of the LCCs that are connected to it in the routing matrix.

Required Privilege Level

view

Output Fields

Table 18 on page 394 describes the output fields for the `show system uptime` command. Output fields are listed in the approximate order in which they appear.

Table 18: show system uptime Output Fields

Field Name	Field Description
`System booted`	(Only for Junos OS Evolved when `node` option is not used) Time system was last booted. From the system's point of view, the system booted time is the time when the system was assembled and is available in **/var/run/system_boot_time**.
`System-wide users`	(Only for Junos OS Evolved when `node` option is not used) Number of system-wide users.
`Current time`	Current system time in UTC.
`Time Source`	Reference time source that the system is locked to.
`System booted`	Date and time when the Routing Engine on the router or switch was last booted and how long it has been running.
`Protocols started`	Date and time when the routing protocols were last started and how long they have been running.

Table 18: show system uptime Output Fields *(Continued)*

Field Name	Field Description
`Last configured`	Date and time when a configuration was last committed. Also shows the name of the user who issued the last `commit` command.
`time` `and up`	Current time, in the local time zone, and how long the router or switch has been operational.
`users`	Number of users logged in to the router or switch.
`load averages`	Load averages for the last 1 minute, 5 minutes, and 15 minutes.

Sample Output

show system uptime

```
user@host> show system uptime
Current time:      2017-10-13 19:45:47 UTC
Time Source:       NTP CLOCK
System booted:     2017-10-12 20:51:41 UTC (22:54:06 ago)
Protocols started: 2017-10-13 19:33:45 UTC (00:12:02 ago)
Last configured:   2017-10-13 19:33:45 UTC (00:12:02 ago) by abc
12:45PM  up 22:54, 2 users, load averages: 0.07, 0.02, 0.01
```

show system uptime node (for Junos OS Evolved)

```
user@host> show system uptime node re0

Current time: 2017-05-16 16:13:18 PDT
Node booted: 2017-05-10 15:45:29 PDT (6d 00:27 ago)
Last configured: 2017-05-10 15:31:46 PDT (6d 00:41 ago) by root
16:13:18 up 6 days, 27 min, 1 user, load averages: 2.69, 2.58, 2.57
```

show system uptime (QFX Series)

```
user@switch> show system uptime
Current time: 2017-08-27 03:12:30 PDT
Time Source: NTP CLOCK
System booted: 2017-08-13 17:11:54 PDT (1w6d 10:00 ago)
Protocols started: 2017-08-13 17:13:56 PDT (1w6d 09:58 ago)
Last configured: 2017-08-26 05:54:00 PDT (21:18:30 ago) by user
 3:12AM  up 13 days, 10:01, 3 users, load averages: 0.00, 0.00, 0.00
```

show system uptime (Junos OS Evolved)

```
user@router> show system uptime

System booted: 2019-02-20 19:17:52 PST (02:20:33 ago)
System-wide users: 7 users
```

Starting in Junos OS Evolved 19.1R1 release, the `show system uptime` output displays only the `System booted` and `System-wide users` information. The output does not display the details such as `Current time`, `System booted`, `Protocols started`, and `Last configured parameters`. To see node-specific uptime information, use the `node` option.

show system uptime node re0 (Junos OS Evolved)

```
user@router> show system uptime node re0
Current time: 2019-07-09 14:24:34 PDT
Time Source:  NTP CLOCK
Node booted: 2019-07-03 09:59:58 PDT (6d 04:24 ago)
Protocols started: 2019-07-03 10:01:41 PDT (6d 04:22 ago)
Last configured: 2019-07-03 10:01:10 PDT (6d 04:23 ago) by root
 2:24PM  up 6 days, 4:24, 1 user, load averages: 1.25, 0.51, 0.36
```

Release Information

Command introduced before Junos OS Release 7.4.

`sfc` option introduced for the TX Matrix Plus router in JUNOS Release 9.6.

`node` option introduced in Junos OS Evolved Release 18.3R1.

RELATED DOCUMENTATION

- 10-Gigabit Ethernet LAN/WAN PIC with XFP (T640 Router)
- Routing Matrix with a TX Matrix Plus Router Solutions Page

show system virtual-memory

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Syntax

```
show system virtual-memory
```

Syntax (EX Series)

```
show system virtual-memory
<all-members>
<local>
<member member-id>
```

Syntax (TX Matrix Router)

```
show system virtual-memory
<all-chassis | all-lcc | lcc number | scc>
```

Syntax (TX Matrix Plus Router)

```
show system virtual-memory
<all-chassis | all-lcc | lcc number | sfc number>
```

Syntax (MX Series Router)

```
show system virtual-memory
<all-members>
<local>
<member member-id>
```

Syntax (QFX Series)

```
show system virtual-memory
<infrastructure name>
<interconnect-device name>
<node-group name>
```

Syntax (Junos OS Evolved)

```
show system virtual-memory
<node node-name>
```

Description

Display the usage of Junos OS kernel memory listed first by size of allocation and then by type of usage. Use the `show system virtual-memory` command for troubleshooting with Juniper Networks Customer Support.

Options

none — Display kernel dynamic memory usage information.

all-chassis — (TX Matrix routers and TX Matrix Plus routers only) (Optional) Display kernel dynamic memory usage information for all chassis.

all-lcc — (TX Matrix routers and TX Matrix Plus routers only) (Optional) On a TX Matrix router, display kernel dynamic memory usage information for all T640 routers connected to the TX Matrix router. On a TX Matrix Plus router, display kernel dynamic memory usage information for all connected T1600 or T4000 LCCs.

all-members — (EX4200 switches and MX Series routers only) (Optional) Display kernel dynamic memory usage information for all members of the Virtual Chassis configuration.

infrastructure *name* — (QFabric systems only) (Optional) Display kernel dynamic memory usage information for the fabric control Routing Engine and fabric manager Routing Engine.

interconnect-device *name* — (QFabric systems only) (Optional) Display kernel dynamic memory usage information for the Interconnect device.

lcc *number* — (TX Matrix routers and TX Matrix Plus routers only) (Optional) On a TX Matrix router, display kernel dynamic memory usage information for a specific T640 router that is connected to the TX Matrix router. On a TX Matrix Plus router, display kernel dynamic memory usage information for a specific router that is connected to the TX Matrix Plus router.

Replace *number* with the following values depending on the LCC configuration:

- 0 through 3, when T640 routers are connected to a TX Matrix router in a routing matrix.
- 0 through 3, when T1600 routers are connected to a TX Matrix Plus router in a routing matrix.
- 0 through 7, when T1600 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.
- 0, 2, 4, or 6, when T4000 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.

local (EX4200 switches and MX Series routers only) (Optional) Display kernel dynamic memory usage information for the local Virtual Chassis member.

member *member-id* (EX4200 switches and MX Series routers only) (Optional) Display kernel dynamic memory usage information for the specified member of the Virtual Chassis configuration. For EX4200 switches, replace *member-id* with a value from 0 through 9. For an MX Series Virtual Chassis, replace *member-id* with a value of 0 or 1.

node *node-name* (Junos OS Evolved only) (Optional) Display the kernel memory information for the specified node. If no node is specified, information is displayed for all nodes.

node-group *name* (QFabric systems only) (Optional) Display kernel dynamic memory usage information for the Node group.

scc (TX Matrix routers only) (Optional) Display kernel dynamic memory usage information for the TX Matrix router (or switch-card chassis).

sfc *number* (TX Matrix Plus routers only) (Optional) Display kernel dynamic memory usage information for the TX Matrix Plus router. Replace *number* with 0.

Additional Information

By default, when you issue the `show system virtual-memory` command on the primary Routing Engine of a TX Matrix router or a TX Matrix Plus router, the command is broadcast to all the primary Routing Engines of the LCCs connected to it in the routing matrix. Likewise, if you issue the same command on the backup Routing Engine of a TX Matrix or a TX Matrix Plus router, the command is broadcast to all backup Routing Engines of the LCCs that are connected to it in the routing matrix.

NOTE: The `show system virtual-memory` command with the `| display XML` pipe option now displays XML output for the command in the parent tags: `<vmstat-memstat-malloc>`, `<vmstat-memstat-zone>`,

<vmstat-sumstat>, <vmstat-intr>, and <vmstat-kernel-state> with each child element as a separate XML tag. In Junos OS Releases 10.1 and earlier, the | display XML option for this command does not have an XML API element and the entire output is displayed in a single <output> tag element.

kernel direct memory map only displays for the 64-bit platform.

Required Privilege Level

view

Output Fields

Table 19 on page 401 lists the output fields for the show system virtual-memory command. Output fields are listed in the approximate order in which they appear.

Table 19: show system virtual-memory Output Fields

Field Name	Field Description
Memory statistics by bucket size	
Size	Memory block size (bytes). The kernel memory allocator appropriates blocks of memory whose size is exactly a power of 2.
In Use	Number of memory blocks of this size that are in use (bytes).
Free	Number of memory blocks of this size that are free (bytes).
Requests	Number of memory allocation requests made.
HighWater	Maximum value the free list can have. Once the system starts reclaiming physical memory, it continues until the free list is increased to this value.
Couldfree	Total number of times that the free elements for a bucket size exceed the high-water mark for that bucket size.
Memory usage type by bucket size	

Table 19: show system virtual-memory Output Fields *(Continued)*

Field Name	Field Description
Size	Memory block size (bytes).
Type(s)	Kernel modules that are using these memory blocks. For a definition of each type, refer to a FreeBSD book.
Memory statistics by type	
Type	Kernel module that is using dynamic memory.
InUse	Number of memory blocks used by this type. The number is rounded up.
MemUse	Amount of memory in use, in kilobytes (KB).
HighUse	Maximum memory ever used by this type.
Limit	Maximum memory that can be allocated to this type.
Requests	Total number of dynamic memory allocation requests this type has made.
Type Limit	Number of times requests were blocked for reaching the maximum limit.
Kern Limit	Number of times requests were blocked for the kernel map.
Size(s)	Memory block sizes this type is using.
Memory Totals	
In Use	Total kernel dynamic memory in use (bytes, rounded up).
Free	Total kernel dynamic memory free (bytes, rounded up).

Table 19: show system virtual-memory Output Fields *(Continued)*

Field Name	Field Description
Requests	Total number of memory allocation requests.
ITEM	Kernel module that is using memory.
Size	Memory block size (bytes).
Limit	Maximum memory that can be allocated to this type.
Used	Number of memory blocks used by this type. The number is rounded up.
Free	Number of memory blocks available to this type.
Requests	Total number of memory allocation requests this type has made.
interrupt	Timer events and scheduling interruptions.
total	Total number of interruptions for each type.
rate	Interruption rate.
Total	Total for all interruptions.

Sample Output

show system virtual-memory

```
user@host> show system virtual-memory
Memory statistics by bucket size
Size   In Use   Free   Requests  HighWater  Couldfree
  16      906    118     154876    1280          0
  32      455    313     209956     640          0
```

```
  64     4412    260      75380     320         20
 128     3200     32      19361     160         81
 256     1510     10       8844      80          4
 512      446      2       5085      40          0
  1K       18      2       5901      20          0
  2K     1128      2       4445      10       1368
  4K      185      1        456       5          0
  8K        5      1       2653       5          0
 16K      181      0        233       5          0
 32K        2      0       1848       5          0
 64K       20      0         22       5          0
128K        5      0          5       5          0
256K        2      0          2       5          0
512K        1      0          1       5          0

Memory usage type by bucket size
Size  Type(s)
  16  uc_devlist, nexusdev, iftable, temp, devbuf, atexit, COS, BPF,
          DEVFS mount, DEVFS node, vnodes, mount, pcb, soname, proc-args, kld,
          MD disk, rman, ATA generic, bus, sysctl, ippool, pfestat, ifstate,
          pfe_ipc, mkey, rtable, ifmaddr, ipfw, rnode
  32  atkbddev, dirrem, mkdir, diradd, freefile, freefrag, indirdep,
          bmsafemap, newblk, temp, devbuf, COS, vnodes, cluster_save buffer,
          pcb, soname, proc-args, sigio, kld, Gzip trees, taskqueue, SWAP,
          eventhandler, bus, sysctl, uidinfo, subproc, pgrp, pfestat, itable32,
          ifstate, pfe_ipc, mkey, rtable, ifmaddr, ipfw, rnode, rtnexthop
  64  isadev, iftable, MFS node, allocindir, allocdirect, pagedep, temp,
          devbuf, lockf, COS, NULLFS hash, DEVFS name, vnodes,
          cluster_save buffer, vfscache, pcb, soname, proc-args, file,
          AR driver, AD driver, Gzip trees, rman, eventhandler, bus, sysctl,
          subproc, pfestat, pic, ifstate, pfe_ipc, mkey, ifaddr, rtable, ipfw
 128  ZONE, freeblks, inodedep, temp, devbuf, zombie, COS, DEVFS node,
          vnodes, mount, vfscache, pcb, soname, proc-args, ttys, dev_t,
          timecounter, kld, Gzip trees, ISOFS node, bus, uidinfo, cred,
          session, pic, itable16, ifstate, pfe_ipc, rtable, ifstat, metrics,
          rtnexthop, iffamily
 256  iflogical, iftable, MFS node, FFS node, newblk, temp, devbuf,
          NFS daemon, vnodes, proc-args, kqueue, file desc, Gzip trees, bus,
          subproc, itable16, ifstate, pfe_ipc, sysctl, rtnexthop
 512  UFS mount, temp, devbuf, mount, BIO buffer, ptys, ttys, AR driver,
          Gzip trees, ISOFS mount, msg, ioctlops, ATA generic, bus, proc,
          pfestat, lr, ifstate, pfe_ipc, rtable, ipfw, ifstat, rtnexthop
  1K  iftable, temp, devbuf, NQNFS Lease, kqueue, kld, AD driver,
```

```
          Gzip trees, sem, MD disk, bus, ifstate, pfe_ipc, ipfw
  2K  uc_devlist, UFS mount, temp, devbuf, BIO buffer, pcb, AR driver,
          Gzip trees, ioctlops, bus, ipfw, ifstat, rcache
  4K  memdesc, iftable, UFS mount, temp, devbuf, kld, Gzip trees, sem, msg
  8K  temp, devbuf, syncache, Gzip trees
 16K  indirdep, temp, devbuf, shm, msg
 32K  pagedep, kld, Gzip trees
 64K  VM pgdata, devbuf, MSDOSFS mount
128K  UFS ihash, inodedep, NFS hash, kld, ISOFS mount
256K  mbuf, vfscache
512K  SWAP

Memory statistics by type                          Type  Kern
        Type  InUse MemUse HighUse  Limit Requests Limit Limit Size(s)
       isadev    13     1K      1K127753K       13     0     0  64
     atkbddev     2     1K      1K127753K        2     0     0  32
   uc_devlist    24     3K      3K127753K       24     0     0  16,2K
     nexusdev     3     1K      1K127753K        3     0     0  16
      memdesc     1     4K      4K127753K        1     0     0  4K
         mbuf     1   152K    152K127753K        1     0     0  256K
    iflogical     6     2K      2K127753K        6     0     0  256
      iftable    17     9K      9K127753K       18     0     0  16,64,256,1K,4K
         ZONE    15     2K      2K127753K       15     0     0  128
    VM pgdata     1    64K     64K127753K        1     0     0  64K
    UFS mount    12    26K     26K127753K       12     0     0  512,2K,4K
    UFS ihash     1   128K    128K127753K        1     0     0  128K
     MFS node     6     2K      3K127753K       35     0     0  64,256
     FFS node   906   227K    227K127753K     1352     0     0  256
       dirrem     0     0K      4K127753K      500     0     0  32
        mkdir     0     0K      1K127753K       38     0     0  32
       diradd     0     0K      6K127753K      521     0     0  32
     freefile     0     0K      4K127753K      374     0     0  32
     freeblks     0     0K      8K127753K      219     0     0  128
     freefrag     0     0K      1K127753K      193     0     0  32
   allocindir     0     0K     25K127753K     1518     0     0  64
      indirdep     0     0K     17K127753K       76     0     0  32,16K
  allocdirect     0     0K     10K127753K      760     0     0  64
    bmsafemap     0     0K      1K127753K       72     0     0  32
       newblk     1     1K      1K127753K     2279     0     0  32,256
     inodedep     1   128K    175K127753K     2367     0     0  128,128K
      pagedep     1    32K     33K127753K       47     0     0  64,32K
         temp  1239    92K     96K127753K     8364     0     0  16,32,64K
       devbuf  1413  5527K   5527K127753K     1535     0     0  16,32,64,128,256
```

```
        lockf    38     3K      3K127753K     2906    0     0  64
       atexit     1     1K      1K127753K        1    0     0  16
       zombie     0     0K      2K127753K     3850    0     0  128
     NFS hash     1   128K    128K127753K        1    0     0  128K
  NQNFS Lease     1     1K      1K127753K        1    0     0  1K
   NFS daemon     1     1K      1K127753K        1    0     0  256
     syncache     1     8K      8K127753K        1    0     0  8K
          COS   353    44K     44K127753K      353    0     0  16,32,64,128
          BPF   189     3K      3K127753K      189    0     0  16
MSDOSFS mount     1    64K     64K127753K        1    0     0  64K
  NULLFS hash     1     1K      1K127753K        1    0     0  64
  DEVFS mount     2     1K      1K127753K        2    0     0  16
   DEVFS name   487    31K     31K127753K      487    0     0  64
   DEVFS node   471    58K     58K127753K      479    0     0  16,128
       vnodes    28     7K      7K127753K      429    0     0  16,32,64,128,256
        mount    15     8K      8K127753K       18    0     0  16,128,512
cluster_save buffer     0     0K      1K127753K       55    0     0  32,64
     vfscache  1898   376K    376K127753K     3228    0     0  64,128,256K
   BIO buffer    49    98K    398K127753K      495    0     0  512,2K
          pcb   159    16K     17K127753K      399    0     0  16,32,64,128,2K
       soname    82    10K     10K127753K    42847    0     0  16,32,64,128
    proc-args    57     2K      3K127753K     2105    0     0  16,32,64,128,256
         ptys    32    16K     16K127753K       32    0     0  512
         ttys   254    33K     33K127753K      522    0     0  128,512
       kqueue     5     3K      4K127753K       23    0     0  256,1K
        sigio     1     1K      1K127753K       27    0     0  32
         file   383    24K     24K127753K    16060    0     0  64
    file desc    76    19K     20K127753K     3968    0     0  256
          shm     1    12K     12K127753K        1    0     0  16K
       dev_t   286    36K     36K127753K      286    0     0  128
  timecounter    10     2K      2K127753K       10    0     0  128
          kld    11   117K    122K127753K       34    0     0  16,32,128,1K,4K
    AR driver     1     1K      3K127753K        5    0     0  64,512,2K
    AD driver     2     2K      3K127753K     2755    0     0  64,1K
   Gzip trees     0     0K     46K127753K   133848    0     0  32,64,128,256
   ISOFS node  1136   142K    142K127753K     1189    0     0  128
  ISOFS mount     9   132K    132K127753K       10    0     0  512,128K
          sem     3     6K      6K127753K        3    0     0  1K,4K
      MD disk     2     2K      2K127753K        2    0     0  16,1K
          msg     4    25K     25K127753K        4    0     0  512,4K,16K
         rman    59     4K      4K127753K      461    0     0  16,64
     ioctlops     0     0K      2K127753K      992    0     0  512,2K
    taskqueue     2     1K      1K127753K        2    0     0  32
```

```
         SWAP     2   413K    413K127753K        2    0     0  32,512K
  ATA generic     6     3K      3K127753K        6    0     0  16,512
 eventhandler    17     1K      1K127753K       17    0     0  32,64
          bus   340    30K     31K127753K      794    0     0  16,32,64,128,256
       sysctl     0     0K      1K127753K   130262    0     0  16,32,64
      uidinfo     4     1K      1K127753K       10    0     0  32,128
         cred    22     3K      3K127753K     3450    0     0  128
      subproc   156    10K     10K127753K     7882    0     0  32,64,256
         proc     2     1K      1K127753K        2    0     0  512
      session    12     2K      2K127753K       34    0     0  128
         pgrp    16     1K      1K127753K       45    0     0  32
       ippool     1     1K      1K127753K        1    0     0  16
      pfestat     0     0K      1K127753K    47349    0     0  16,32,64,512
          pic     5     1K      1K127753K        5    0     0  64,128
           lr     1     1K      1K127753K        1    0     0  512
     itable32   110     4K      4K127753K      110    0     0  32
     itable16   161    26K     26K127753K      161    0     0  128,256
      ifstate   694   159K    160K127753K     1735    0     0  16,32,64,128,1K
      pfe_ipc     0     0K      1K127753K    56218    0     0  16,32,64,128,1K
         mkey   250     4K      4K127753K      824    0     0  16,32,64
       ifaddr     9     1K      1K127753K        9    0     0  64
       sysctl     0     0K      1K127753K       30    0     0  256
       rtable    49     6K      6K127753K      307    0     0  16,32,64,128,512
      ifmaddr    22     1K      1K127753K       22    0     0  16,32
         ipfw    23    10K     10K127753K       48    0     0  16,32,64,512,2K
       ifstat   698   805K    805K127753K      698    0     0  128,512,2K
       rcache     4     8K      8K127753K        4    0     0  2K
        rnode    27     1K      1K127753K      285    0     0  16,32
      metrics     1     1K      1K127753K        3    0     0  128
    rtnexthop    57     9K      9K127753K      312    0     0  32,128,256,512
     iffamily    12     2K      2K127753K       12    0     0  128

Memory Totals:  In Use       Free    Requests
                 9311K        54K      489068

ITEM            SIZE     LIMIT    USED    FREE  REQUESTS
PIPE:            192,        0,      4,     81,     4422
SWAPMETA:        160,    95814,      0,      0,        0
unpcb:           160,        0,    114,     36,      279
ripcb:           192,    25330,      5,     37,        5
syncache:        128,    15359,      0,     64,        5
tcpcb:           576,    25330,     23,     12,       32
udpcb:           192,    25330,     14,     28,      255
```

```
socket:          256,    25330,    246,     26,      819
KNOTE:            96,        0,     27,     57,       71
NFSNODE:         352,        0,      0,      0,        0
NFSMOUNT:        544,        0,      0,      0,        0
VNODE:           224,        0,   2778,     43,     2778
NAMEI:          1024,        0,      0,      8,    40725
VMSPACE:         192,        0,     57,     71,     3906
PROC:            448,        0,     73,     17,     3923
DP fakepg:        64,        0,      0,      0,        0
PV ENTRY:         28,   499566,  44530, 152053,  1525141
MAP ENTRY:        48,        0,   1439,    134,   351075
KMAP ENTRY:       48,    35645,    179,    119,    10904
MAP:             108,        0,      7,      3,        7
VM OBJECT:        92,        0,   2575,    109,    66912

   792644 cpu context switches
  9863474 device interrupts
   286510 software interrupts
   390851 traps
  3596829 system calls
       16 kernel threads created
     3880  fork() calls
       27 vfork() calls
        0 rfork() calls
        0 swap pager pageins
        0 swap pager pages paged in
        0 swap pager pageouts
        0 swap pager pages paged out
      380 vnode pager pageins
      395 vnode pager pages paged in
      122 vnode pager pageouts
     1476 vnode pager pages paged out
        0 page daemon wakeups
        0 pages examined by the page daemon
      101 pages reactivated
   161722 copy-on-write faults
        0 copy-on-write optimized faults
    84623 zero fill pages zeroed
    83063 zero fill pages prezeroed
        7 intransit blocking page faults
   535606 total VM faults taken
        0 pages affected by kernel thread creation
   238254 pages affected by  fork()
```

```
      2535 pages affected by vfork()
         0 pages affected by rfork()
    283379 pages freed
         0 pages freed by daemon
    190091 pages freed by exiting processes
     17458 pages active
     29166 pages inactive
         0 pages in VM cache
     10395 pages wired down
    134610 pages free
      4096 bytes per page
    183419 total name lookups
           cache hits (90% pos + 7% neg) system 0% per-directory
           deletions 0%, falsehits 0%, toolong 0%

interrupt                   total       rate
ata0 irq14                 113338          3
mux irq7                   727643         21
fxp1 irq10                1178671         34
sio0 irq4                     833          0
clk irq0                 3439769         99
rtc irq8                 4403221        127
Total                    9863475        286

Kernel direct memory map:
        4423  pages used
     4057340  pages maximum
```

Release Information

Command introduced before Junos OS Release 7.4.

`sfc` option introduced for the TX Matrix Plus router in Junos OS Release 9.6.

`node` option introduced in Junos OS Evolved Release 18.3R1.

RELATED DOCUMENTATION

- Routing Matrix with a TX Matrix Plus Router Solutions Page

show task

IN THIS SECTION

- Syntax | 410
- Description | 410
- Options | 410
- Required Privilege Level | 411
- Output Fields | 411
- Sample Output | 412
- Release Information | 413

Syntax

```
show task
    <logical-system (all | logical-system-name)>
    <task-name>
    io
    logical-system-mux
    memory
    replication
    scheduler-slip-history
    snooping
    summary
```

Description

Display routing protocol tasks on the Routing Engine.

Options

none	Display all routing protocol tasks on the Routing Engine.

logical-system (all | *logical-system-name*)	(Optional) Perform this operation on all logical systems or on a particular logical system.
logical-system-mux	Display the logical router multiplexer process (lrmuxd) per-task information.
task-name	(Optional) Display information about running tasks for all tasks whose name begins with this string (for example, `BGP_Group_69_153` and `BGP_Group_70_153` are both displayed when you run the `show task BGP_Group` command).
io	Show i/o statistics for all tasks displayed.
memory	Show memory statistics for all tasks displayed.
replication	Show only replication tasks.
scheduler-slip-history	Show the number of scheduler slips (wherein the scheduler is unable to provide requested CPU time to a process) that have occurred since the last RPD start, including some scheduler slip details.
snooping	Show only snooping tasks.
summary	(Optional) Display summary information about running tasks.

Required Privilege Level

view

Output Fields

Table 20 on page 411 describes the output fields for the `show task` command. Output fields are listed in the approximate order in which they appear.

Table 20: show task Output Fields

Field Name	Field Description
`Pri`	Current priority of the process. A lower number indicates a higher priority.
`Task Name`	Name of the task.

Table 20: show task Output Fields *(Continued)*

Field Name	Field Description
Pro	IP protocol number associated with the process.
Port	TCP or UDP port number associated with the task.
So	Socket number of the task.
Flags	Flags for the task: • Accept—Task is waiting for incoming connections. • Connect—Task is waiting for a connection to be completed. • Delete—Task has been deleted and is being cleaned up. • LowPrio— Task will be dispatched to read its socket after other higher-priority tasks.

Sample Output

show task

```
user@host> show task
Pri Task Name                          Pro  Port So Flags
 10 IF
 15 LABEL
 15 ISO
 15 INET                                          7
 20 Aggregate
 20 RT
 30 ICMP                                  1       9
 39 ISIS I/O                                     12
 40 IS-IS                                        10
 40 BGP RT Background                               <LowPrio>
 40 BGP.0.0.0.0+179                          179 15 <Accept LowPrio>
 50 BGP_69.192.168.201.234+179               179 17 <LowPrio>
 50 BGP_70.192.168.201.233+179               179 16 <LowPrio>
 50 BGP_Group_69_153                                <LowPrio>
```

```
 50 BGP_Group_70_153                                <LowPrio>
 50 ASPaths
 60 KRT                                 255        1
 60 Redirect
 70 MGMT.local                                     14 <LowPrio>
 70 MGMT_Listen./var/run/rpd_mgmt                  13 <Accept LowPrio>
 70 SNMP Subagent./var/run/sub_rpd.sock             8 <LowPrio>
 40 KRT IO task                                                {krtio-th}
 40 krtio-th                                                   {krtio-th}
 60 krt solic client                    255        85 <ReadDisableWriteDisable>    {krtio-th}
 13 rsvp-iobagent./var/run/sub_rpd.sock            46 <WriteDisable> {rsvp-io}
 80 jtrace_jthr_task                    255        85                 {TraceThread}
```

show task scheduler-slip-history

```
user@host> show task scheduler-slip-history
Scheduler Slip Report:
Total number of Scheduler Slips: 11
Scheduler Slip Logs(last 64):
Timestamp           Total            User          System
10/13/21 09:19:08     5 sec     0 sec 382 usec 0 sec 0 usec
10/13/21 09:18:55     5 sec     0 sec 575 usec 0 sec 0 usec
10/13/21 09:18:26     5 sec     0 sec 483 usec 0 sec 0 usec
10/13/21 09:18:20     5 sec     0 sec 616 usec 0 sec 0 usec
10/13/21 09:18:14     5 sec     0 sec 471 usec 0 sec 0 usec
10/13/21 09:17:58     5 sec     0 sec 0 usec  0 sec 90 usec
10/13/21 09:17:52     5 sec     0 sec 0 usec  0 sec 6290 usec
10/13/21 09:17:46     5 sec     0 sec 543 usec 0 sec 0 usec
10/13/21 09:17:40     5 sec     0 sec 1368 usec 0 sec 0 usec
10/13/21 09:17:34     5 sec     0 sec 487 usec 0 sec 0 usec
```

Release Information

Command introduced before Junos OS Release 7.4.

RELATED DOCUMENTATION

show task io | 414

show task logical-system-mux | 417
show task memory | 420

show task io

IN THIS SECTION

- Syntax | 414
- Syntax (EX Series Switches) | 414
- Description | 414
- Options | 415
- Required Privilege Level | 415
- Output Fields | 415
- Sample Output | 416
- Release Information | 417

Syntax

```
show task io
<logical-system (all | logical-system-name)>
```

Syntax (EX Series Switches)

```
show task io
```

Description

Display I/O statistics for routing protocol tasks on the Routing Engine.

Options

none	Display I/O statistics for routing protocol tasks on the Routing Engine.
logical-system (all | *logical-system-name*)	(Optional) Perform this operation on all logical systems or on a particular logical system.

Required Privilege Level

view

Output Fields

Table 21 on page 415 describes the output fields for the `show task io` command. Output fields are listed in the approximate order in which they appear.

Table 21: show task io Output Fields

Field Name	Field Description
`Task Name`	Name of the task.
`Reads`	Number of input ready notifications.
`Writes`	Number of output ready notifications.
`Rcvd`	Number of requests to the kernel for input.
`Sent`	Number of requests to the kernel for output.
`Dropped`	Number of sent requests that failed.

Sample Output

show task io

```
user@host> show task io
Task Name                          Reads  Writes    Rcvd    Sent Dropped
 LMP Client                            1       1       0       0       0
 IF                                    0       0       0       0       0
 INET6                                 0       0       0       0       0
 INET                                  0       0       0       0       0
 ISO                                   0       0       0       0       0
 Memory                                0       0       0       0       0
 RPD Unix Domain Server./var/ru        0       0       0       0       0
 RPD Unix Domain Server./var/ru        1       0       0       0       0
 RPD Unix Domain Server./var/ru        2       0       0       0       0
 RPD Server.0.0.0.0+666                0       0       0       0       0
 Aggregate                             0       0       0       0       0
 RT                                    0       0       0       0       0
 ICMP                                  0       0       0       0       0
 Router-Advertisement                  0       0       0       0       0
 ICMPv6                                0       0       0       0       0
 IS-IS I/O./var/run/ppmd_contro     1307       1       0       0       0
 l2vpn global task                     0       0       0       0       0
 IS-IS                                 0       0       0       0       0
 BFD I/O./var/run/bfdd_control      1307       1       0       0       0
 TED                                   0       0       0       0       0
 ASPaths                               0       0       0       0       0
 Resolve tree 1                        0       0       0       0       0
 KStat                                 0       0       0       0       0
 KRT Request                           0       0      63       0       0
 KRT Ifstate                         106       0     295       0       0
 KRT                                   0       0       0       0       0
 Redirect                              0       0       0       0       0
 KRT IO task                           0       0       0       0       0            {krtio-th}
 krtio-th                              0       0       0       0       0            {krtio-th}
 krt solic client                      0       1       0       0       0            {krtio-th}
 rsvp-io                           83826       0  117827  139682       0            {rsvp-io}
 jtrace_jthr_task                      0       0       0       0       0            {TraceThread}

...
```

Release Information

Command introduced before Junos OS Release 7.4.

show task logical-system-mux

IN THIS SECTION

- Syntax | 417
- Description | 417
- Options | 417
- Required Privilege Level | 418
- Output Fields | 418
- Sample Output | 419
- Release Information | 420

Syntax

```
show task logical-system-mux <task-name>
    <io>
    <memory>
    <replication>
<summary>
```

Description

Display the logical router multiplexer process (lrmuxd) per-task information.

Options

none Display all the logical router multiplexer process (lrmuxd) per-task information.

task-name	(Optional) Display information about running tasks for all tasks whose name begins with this string (for example, `lsys_session_task:lr2` and `lsys_session_task:lr1` are both displayed when you run the `show task logical-system-mux lsys` command).
io	Show I/O statistics for all tasks displayed.
memory	Show memory statistics for all lrmuxd processes displayed.
replication	Show only replication tasks.
summary	Display summary information about running tasks.

Required Privilege Level

view

Output Fields

Table 22 on page 418 describes the output fields for the `show task logical-system-mux` command. Output fields are listed in the approximate order in which they appear.

Table 22: show task logical-system-mux Output Fields

Field Name	Field Description
`Pri`	Current priority of the process. A lower number indicates a higher priority.
`Task Name`	Name of the task.
`Pro`	IP number associated with the process.
`Port`	TCP or UDP port number associated with the task.
`So`	Socket number of the task.

Table 22: show task logical-system-mux Output Fields *(Continued)*

Field Name	Field Description
Flags	Flags for the task: • Accept—Task is waiting for incoming connections. • Connect—Task is waiting for a connection to be completed. • Delete—Task has been deleted and is being cleaned up. • LowPrio— Task will be dispatched to read its socket after other higher-priority tasks.

Sample Output

show task logical-system-mux

```
user@host> show task logical-system-mux
Pri Task Name                          Pro  Port So Flags
 15 Memory
 40 lsys_session_task:lr2                        14 <WriteDisable>
 40 lsys_session_task:lr1                        11 <WriteDisable>
 40 lrmuxd lsys info task
 60 Mirror Task.128.0.0.6                 63793  9 <WriteDisable>
 70 MGMT.local                                   15 <WriteDisable>
 70 MGMT_Listen./var/run/lrmuxd_mgmt              6 <Accept WriteDisable>
```

show task logical-system-mux io

```
user@host> show task logical-system-mux io
Task Name                        Reads  Writes    Rcvd    Sent Dropped
 Memory                              0       0       0       0       0
 lsys_session_task:lr2               7       2       0       0       0
 lsys_session_task:lr1               7       2       0       0       0
 lrmuxd lsys info task               0       0       0       0       0
 Mirror Task.128.0.0.6            1940       1       0       0       0
 MGMT.local                          0       0       1       0       0
 MGMT_Listen./var/run/lrmuxd_mg     12       0      12       0       0
```

show task logical-system-mux memory

```
user@host> show task logical-system-mux memory
Memory                 Size (kB)  Percentage  When
  Currently In Use:         1483          0%  now
  Maximum Ever Used:        1483          0%  13/03/20 02:28:18
  Available:             1589641        100%  now
```

Release Information

Command introduced in Junos OS Release 13.3.

RELATED DOCUMENTATION

- show task | 410
- show task io | 414
- show task memory | 420

show task memory

IN THIS SECTION

- Syntax | 421
- Syntax (EX Series Switches) | 421
- Description | 421
- Options | 421
- Required Privilege Level | 421
- Output Fields | 422
- Sample Output | 424
- Release Information | 426

Syntax

```
show task memory
<brief | detail | history | summary>
<logical-system (all | logical-system-name)>
```

Syntax (EX Series Switches)

```
show task memory
<brief | detail | history | summary>
```

Description

Display memory utilization for routing protocol tasks on the Routing Engine.

NOTE: The `show task memory` command does not display all the memory used by the routing protocol process. This value does not account for the memory used for the `TEXT` and `STACK` segments, or the memory used by the routing protocol process's internal memory manager.

Options

none	Display standard information about memory utilization for routing protocol tasks on the Routing Engine on all logical systems.
brief | detail | history | summary	(Optional) Display the specified level of output. Use the `history` option to display a history of memory utilization information.
logical-system (all | *logical-system-name*)	(Optional) Perform this operation on all logical systems or on a particular logical system.

Required Privilege Level

view

Output Fields

Table 23 on page 422 describes the output fields for the `show task memory` command. Output fields are listed in the approximate order in which they appear.

Table 23: show task memory Output Fields

Field Name	Field Description	Level of Output
`Memory Currently In Use`	Memory currently in use. Dynamically allocated memory plus the `DATA` segment memory in kilobytes.	All levels
`Memory Maximum Ever Used`	Maximum memory ever used.	none specified, `brief`, `history`
`Memory Available`	Memory currently available. **NOTE**: The maximum currently available memory is displayed incorrectly. On 32-bit Junos OS, the actual available memory is 2,097,152 kilobytes (2147483648 / 1024) but instead it is displayed as 2,147,484 kilobytes (2147483648 / 1000). On 64-bit Junos OS, the actual available memory is 3,145,728 kilobytes (3221225472 / 1024) but instead it is displayed as 3221225 kilobytes (3221225472 / 1000).	none specified, `brief`
`Size (kB)`	Memory capacity in 1000-byte kilobytes.	none specified, `brief`, `history`, `summary`
`Percentage`	Percentage of memory currently available.	none specified, `brief`
`When`	Timestamp.	none specified, `brief`, `history`

Table 23: show task memory Output Fields *(Continued)*

Field Name	Field Description	Level of Output
`Overall Memory Report`	Memory utilization by memory size: • `Size`—Block size, in bytes. • `TXP`—`T` indicates transient memory, `X` indicates exclusive memory, and `P` indicates full page. • `Allocs`—Number of blocks allocated for named objects. • `Mallocs`—Number of blocks allocated for anonymous objects. • `Alloc Bytes`—Number of blocks allocated times block size. • `MaxAllocs`—Maximum value of`Allocs`. • `MaxBytes`—Maximum value of `Alloc Bytes`. • *`FreeBytes`*—Total number of bytes unused on memory pages for this block size.	`detail`
`Allocator Memory Report`	Memory utilization by named objects: • `Size`—Size of the named object in bytes. • `Alloc Size`—Actual memory used by that object in bytes. • `DTXP`—`D` indicates debug, `T` indicates transient memory, `X` indicates exclusive memory, and `P` indicates full page. • `Alloc Blocks`—Number of named objects allocated. • `AllocBytes`—Number of blocks allocated times block size. • `MaxAlloc Blocks`—Maximum value of `Alloc Blocks`. • `Max Alloc Bytes`—Maximum value of `AllocBytes`.	`detail`

Table 23: show task memory Output Fields *(Continued)*

Field Name	Field Description	Level of Output
Malloc Usage Report	Memory utilization for miscellaneous use: • Allocs—Number of allocations. • Bytes—Total bytes consumed. • MaxAllocs—Maximum value of Allocs. • MaxBytes—Maximum value of Bytes. • FuncCalls—Cumulative number of Allocs.	detail
Dynamically allocated memory	Memory allocated dynamically by the system.	detail
Program data+BSS memory	Program and base station subsystem (BSS) memory.	detail
Page data overhead	Internal memory overhead.	detail
Page directory size	Internal memory overhead.	detail
Total bytes in use	Total memory, in bytes, that is currently in use and percentage of available memory (in parentheses).	detail

Sample Output

show task memory

```
user@host> show task memory
Memory                Size (kB)  Percentage  When
  Currently In Use:       29417          3%  now
```

```
  Maximum Ever Used:       33882          4%  00/02/11 22:07:03
  Available:              756281        100%  now
```

show task memory detail

```
user@host> show task memory detail
------------------------ Overall Memory Report ------------------------
  Size TP    Allocs   Mallocs  AllocBytes  MaxAllocs    MaxBytes  FreeBytes
     8            -       111         888        112         896       3208
    12           92       149        2892        247        2964       1204
    12 T          -         -           -          5          60          -
    16            7        11         288         23         368       3808
    20          100        33        2660        164        3280       1436
    20 T          -         -           -         40         800          -
    24          162        15        4248        177        4248       3944
    24 T          -         -           -          4          96          -
    28          371         -       10388        372       10416       1900
    32            6        23         928         30         960       3168
...
------------------------------------------------------------------------
                                  606182                715302     118810

  ------------------------ Allocator Memory Report ------------------------
  Name                 Size Alloc DTP    Alloc     Alloc MaxAlloc  MaxAlloc
                          Size       Blocks     Bytes   Blocks     Bytes
  patroot                8    12           84      1008       87      1044
  sockaddr_un.i802       8    12            2        24        2        24
  cos_nhm_nh             8    12            1        12        1        12
  sockaddr_un.tag        8    12            3        36        4        48
  gw_entry_list          8    12            1        12        1        12
  bgp_riblist_01         8    12            1        12        2        24
  ospf_intf_ev           8    12            -         -        6        72
  krt_remnant_rt         8    12  T         -         -        5        60
...
  ------------------------------------------------------------------------
                                           164108             221552

  -------------------------- Malloc Usage Report --------------------------
  Name                       Allocs     Bytes MaxAllocs  MaxBytes  FuncCalls
  MGMT.local                      1         8         1         8          1
  BGP.0.0.0.0+179                 -         -         1         8          2
```

```
BGP RT Background              4     74748         4     74748         4
SNMP Subagent./var/run/        -        52         1      9172        56
OSPFv2 I/O./var/run/ppm        1     66536         2     66552      4551
OSPF                           6     67655         7     67703        68
KRT                            -         -         1      3784        18
ASPaths                        3        80         3        80         3
-- sockaddr --              183      2100       184      2108      1645
BFD I/O./var/run/bfdd_c        1     65535         2     65551      4555
RT                            48       872        48       872        48
Scheduler                     42       628        43       628        88
--Anonymous--                 56      1100        58      1140       112
--System--                    82     58364       114     60044      4654
------------------------------------------------------------------------
                                    337678            352398

  Dynamically allocated memory:     765952      Maximum:    765952
       Program data+BSS memory:    1568768      Maximum:   1568768
            Page data overhead:      53248      Maximum:     53248
           Page directory size:       4096      Maximum:      4096
                               ----------
            Total bytes in use:    2392064 (0% of available memory)
```

Release Information

Command introduced before Junos OS Release 7.4.

show task replication

IN THIS SECTION

- Syntax | 427
- Description | 427
- Options | 427
- Required Privilege Level | 427
- Output Fields | 427
- Sample Output | 428

Release Information | 429

Syntax

```
show task replication
```

Description

Displays nonstop active routing (NSR) status. When you issue this command on the primary Routing Engine, the status of nonstop active routing synchronization is also displayed.

CAUTION: If BGP is configured, before attempting nonstop active routing switchover, check the output of `show bgp replication` to confirm that BGP routing table synchronization has completed on the backup Routing Engine. The `complete` status in the output of `show task replication` only indicates that the socket replication has completed and the BGP synchronization is in progress.

To determine whether BGP synchronization is complete, you must check the `Protocol state` and `Synchronization state` fields in the output of `show bgp replication` on the primary Routing Engine. The `Protocol state` must be `idle` and the `Synchronization state` must be `complete`. If you perform NSR switchover before the BGP synchronization has completed, the BGP session might flap.

Options

This command has no options.

Required Privilege Level

view

Output Fields

Table 24 on page 428 lists the output fields for the `show task replication` command. Output fields are listed in the approximate order in which they appear.

Table 24: show task replication Output Fields

Field Name	Field Description
`Stateful replication`	Displays whether or not graceful Routing Engine switchover is configured. The status can be `Enabled` or `Disabled`.
`RE mode`	Displays the Routing Engine on which the command is issued: `Master`, `Backup`, or `Not applicable` (when the router has only one Routing Engine).
`Protocol`	Protocols that are supported by nonstop active routing.
`Synchronization Status`	Nonstop active routing synchronization status for the supported protocols. States are `NotStarted`, `InProgress`, and `Complete`. Synchronization states are shown for each of the supported protocols that are running on the device at that moment.

Sample Output

show task replication (Issued on the Primary Routing Engine)

```
user@host> show task replication
         Stateful Replication: Enabled
         RE mode: Master

     Protocol                Synchronization Status
     OSPF                    NotStarted
     BGP                     Complete
     IS-IS                   NotStarted
     LDP                     Complete
     PIM                     Complete
```

show task replication (Issued on the Backup Routing Engine)

```
user@host> show task replication
         Stateful Replication: Enabled
         RE mode: Backup
```

show task replication (Junos OS Evolved)

In Junos OS Evolved, both the primary and backup Routings have the same CLI output. If you configured any protocol, you should see the synchronization state for the same.

```
user@host> show task replication

         Stateful Replication: Enabled
         RE mode: Master

     Protocol                Synchronization Status
     OSPF                    NotStarted
     BGP                     Complete
     IS-IS                   NotStarted
     LDP                     Complete
     PIM                     Complete
```

Release Information

Command introduced in Junos OS Release 8.5.

Support for logical systems introduced in Junos OS Release 13.3

RELATED DOCUMENTATION

> *Example: Configuring Nonstop Active Routing on Switches*